T02290"68Z8860

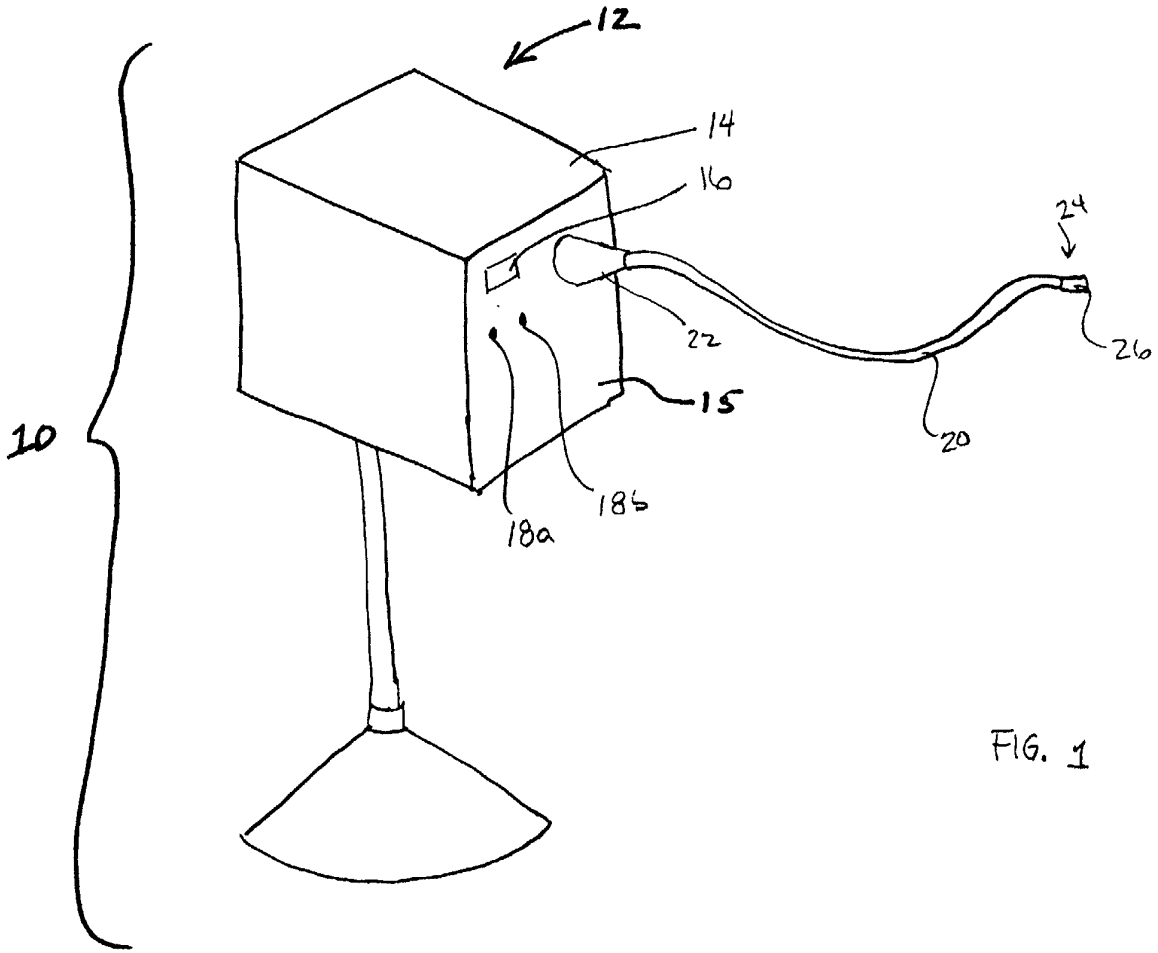


FIG. 1

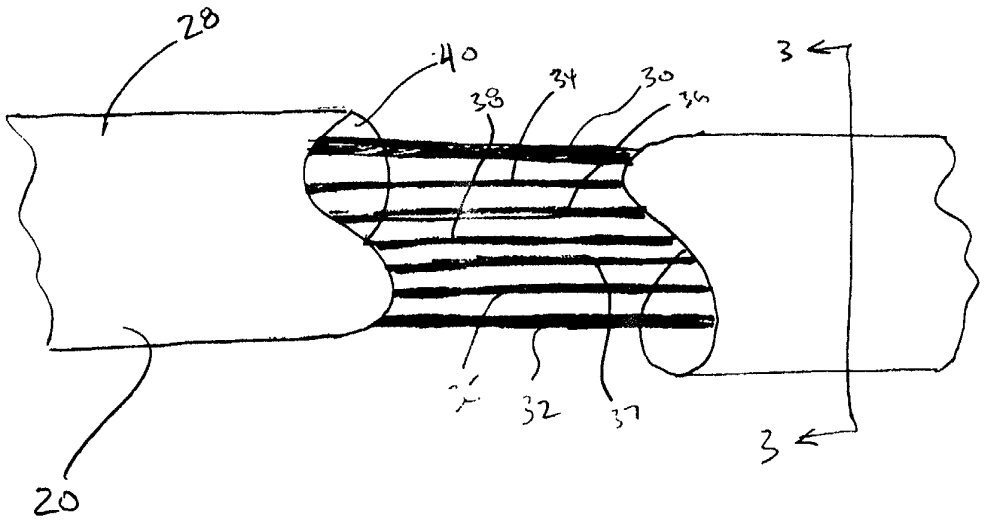


FIG. 2

09697/03-05/2001

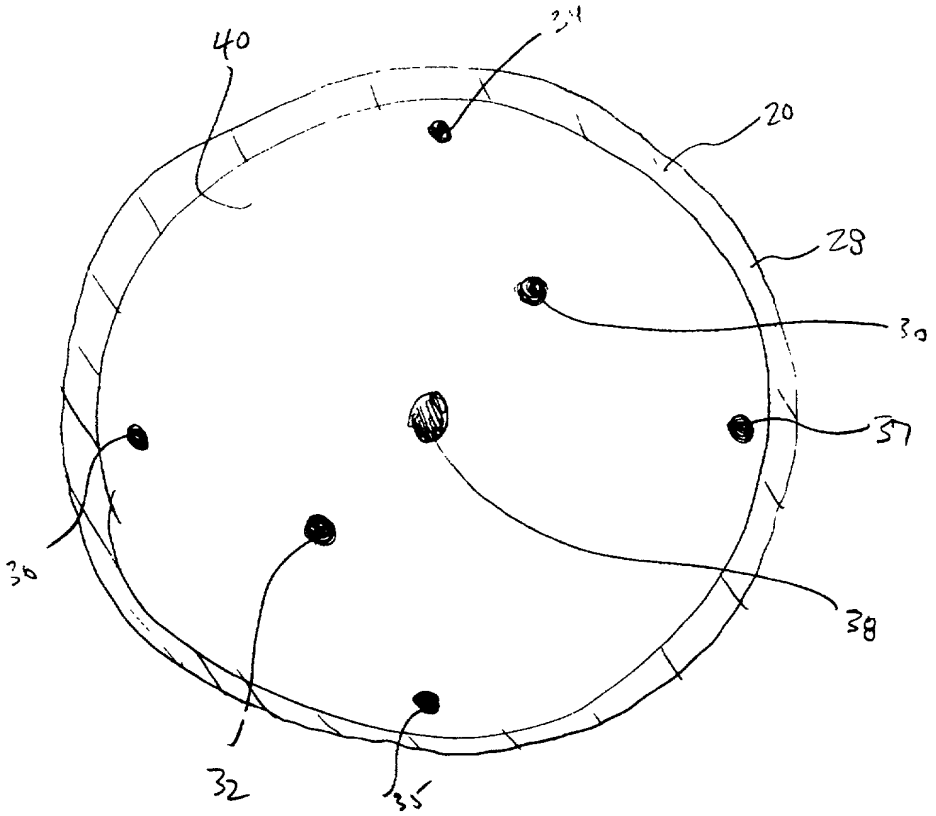


FIG. 3

FOR 2910: 6827868.01

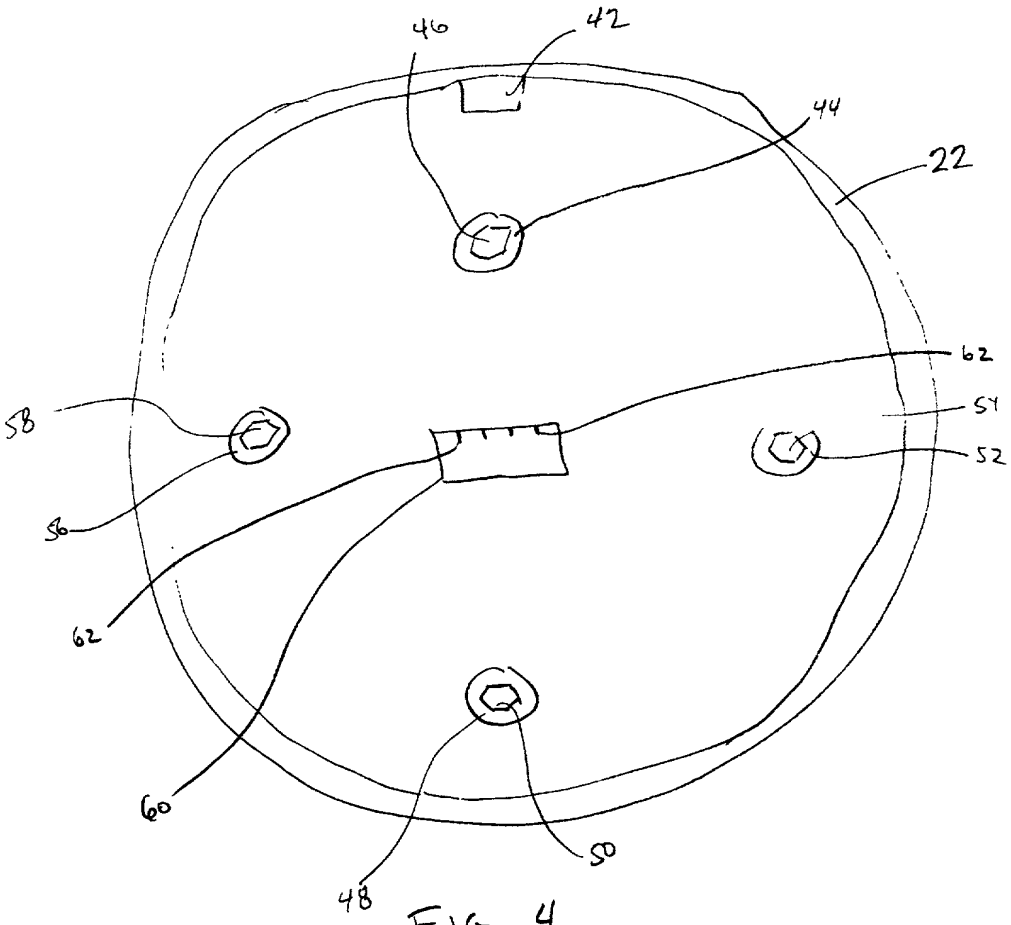


FIG. 4

US 2005/0267569 A1

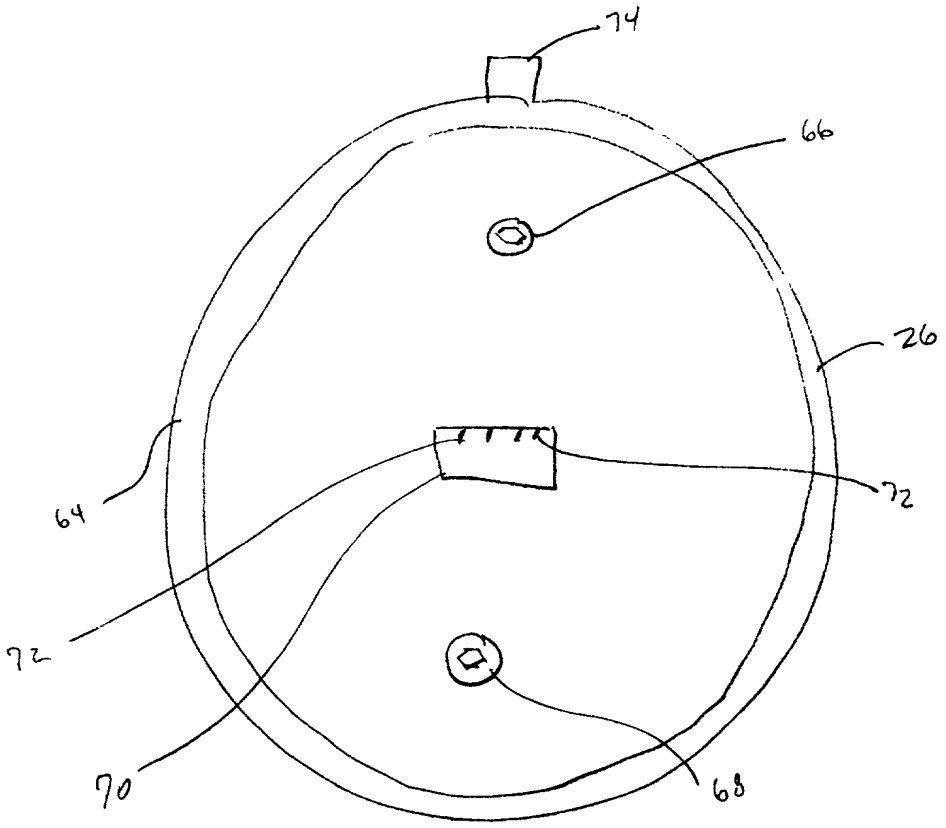


FIG. 5

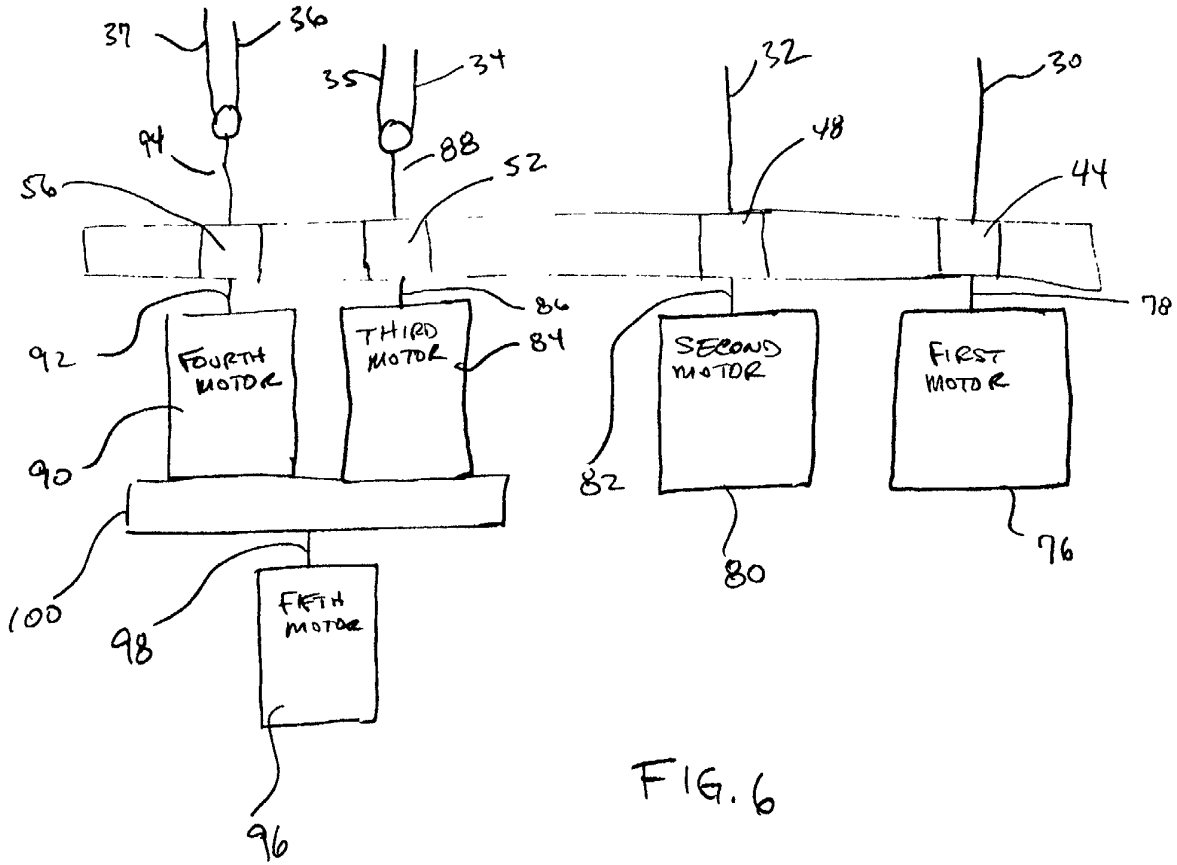

37
36
35
34
32
30
94
88
48
56
52
44
86
78
92
FOURTH MOTOR
THIRD MOTOR
84
SECOND MOTOR
FIRST MOTOR
90
82
100
98
FIFTH MOTOR
80
76
96

FIG. 6

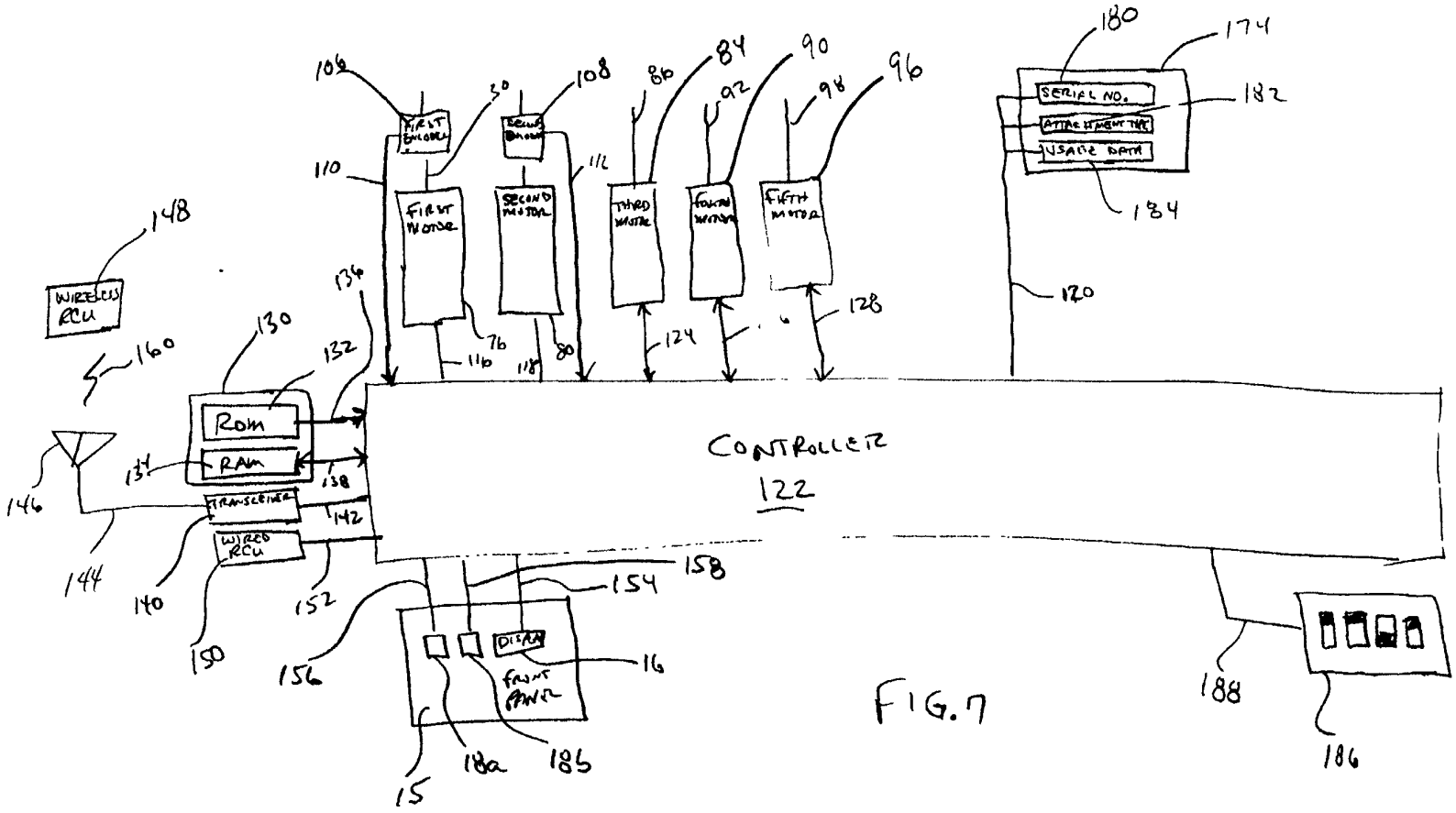

CONTROLLER
122
ROM
RAM
TRANSCEIVER
WIRED RCU
WIRELESS RCU
FIRST MOTOR
SECOND MOTOR
THIRD MOTOR
FOURTH MOTOR
FIFTH MOTOR
SERIAL NO.
ATTACHMENT TYPE
USAGE DATA
DISPLAY
FRONT PANEL
148
160
130
132
134
146
144
140
150
152
156
154
158
16
15
18a
185
180
174
182
184
120
128
124
188
186

FIG. 7

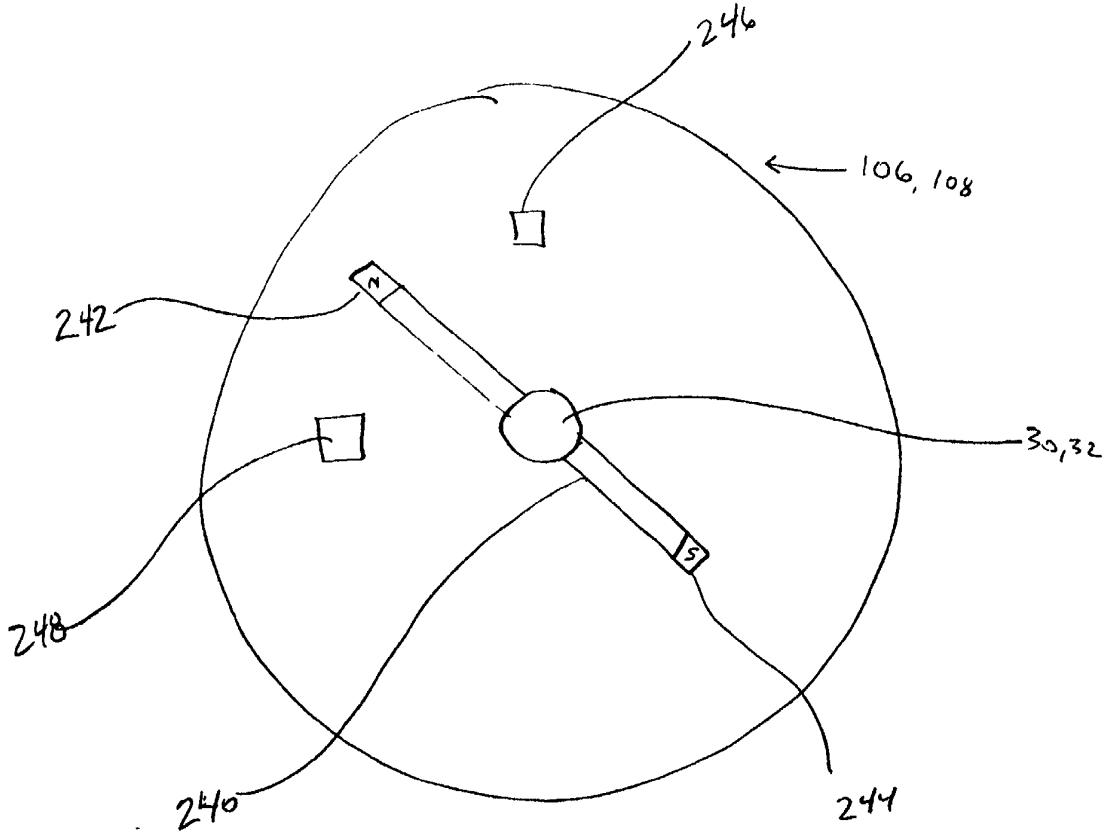


Fig. 8

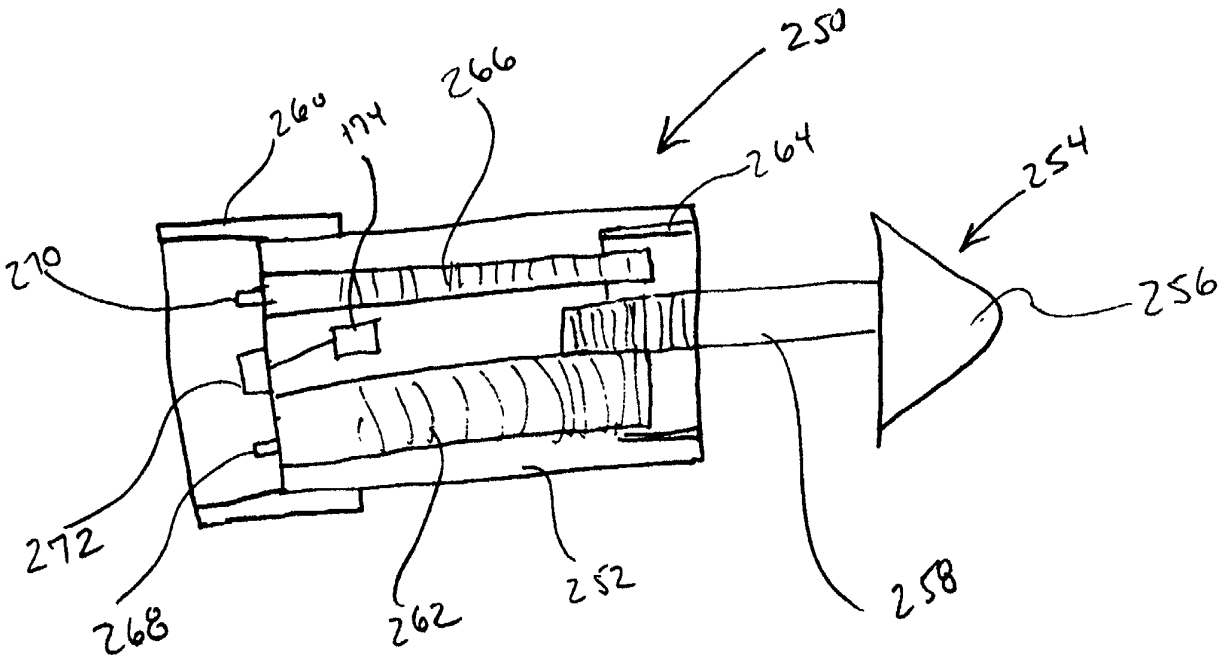


Fig. 9A

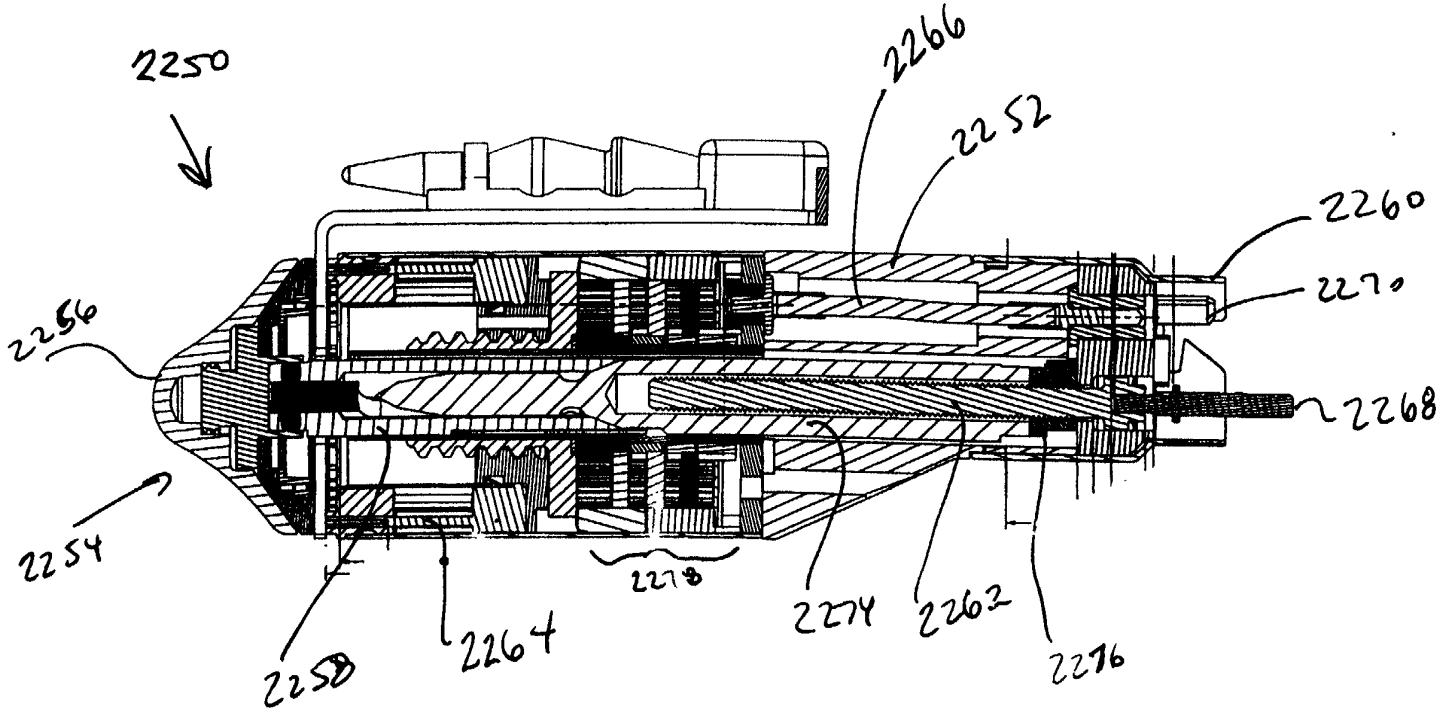

2250
2266
2252
2260
2270
2256
2268
2254
2278
2274
2262
2276
2258
2264

FIGURE 9B

US 2020/0268460 A1

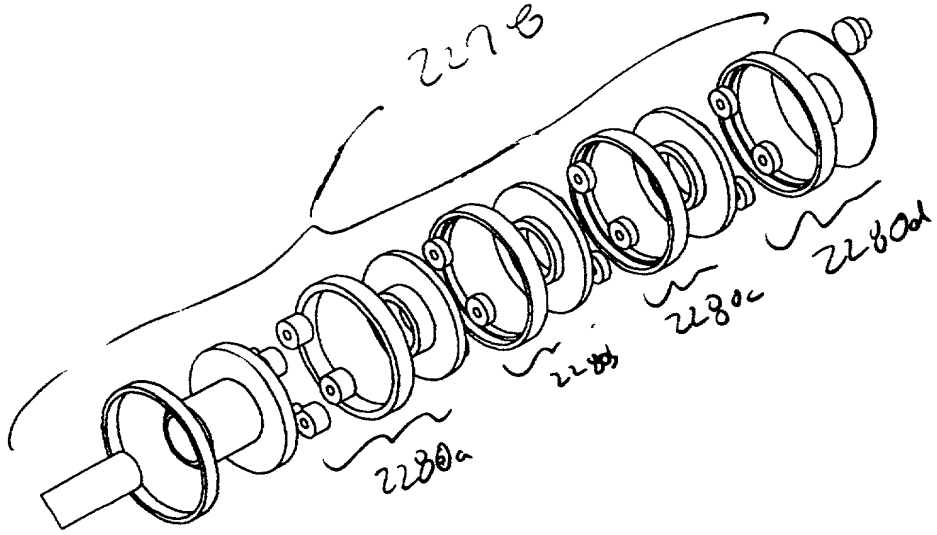


FIG. 9C

T02290"68Z8860

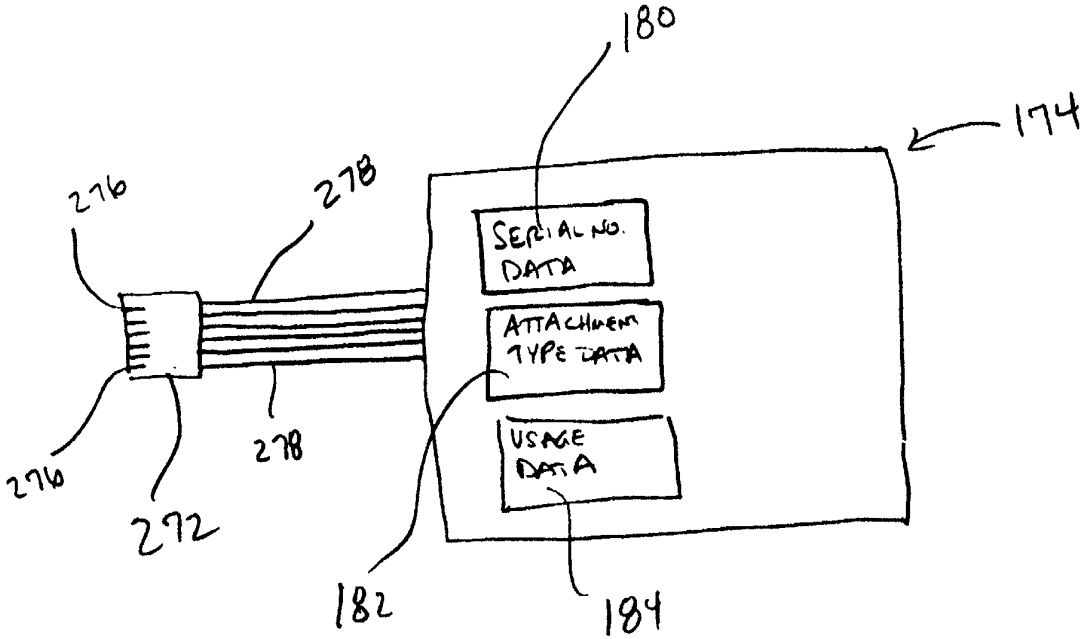


FIG. 10

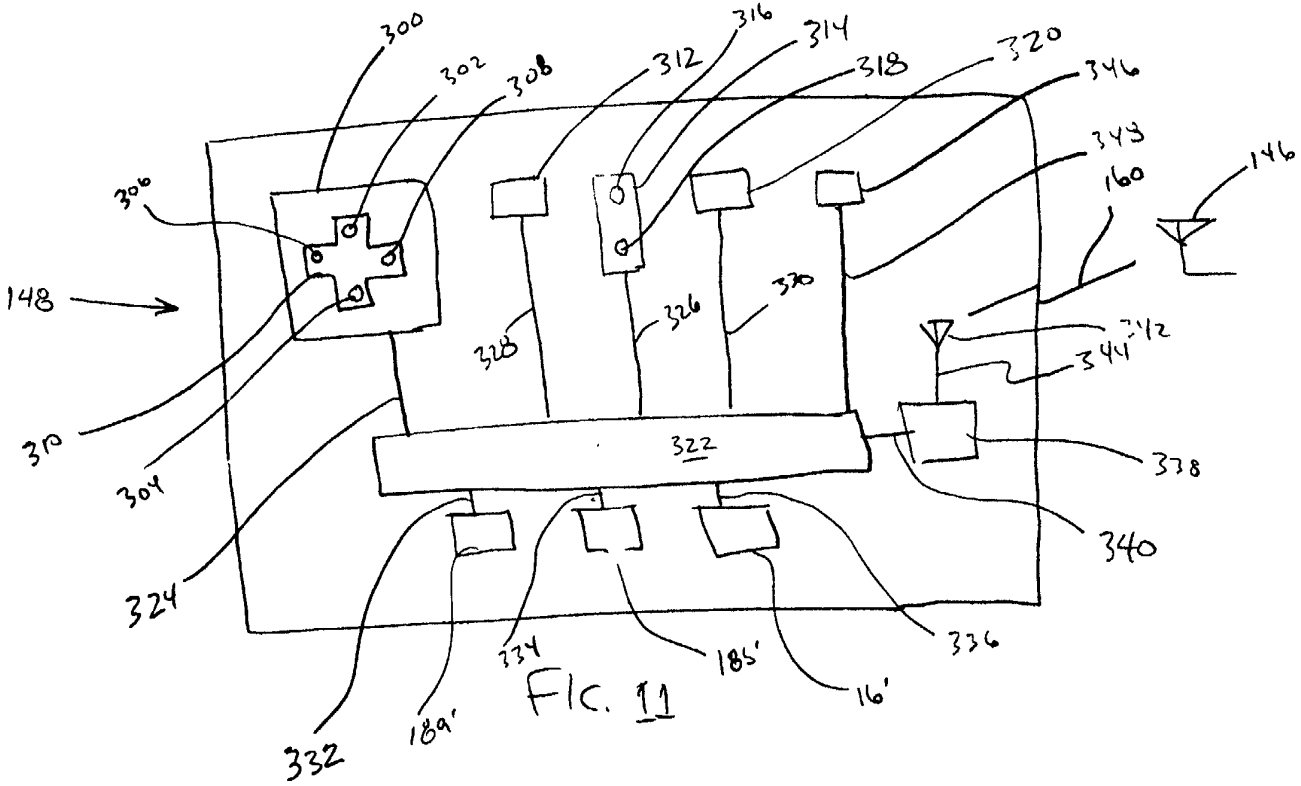

300
302
308
312
316
314
318
320
346
343
160
146
306
148
310
304
328
326
330
342
344
322
338
340
324
332
189'
334
185'
16'
336

FIG. 11

TO2290 "68278860

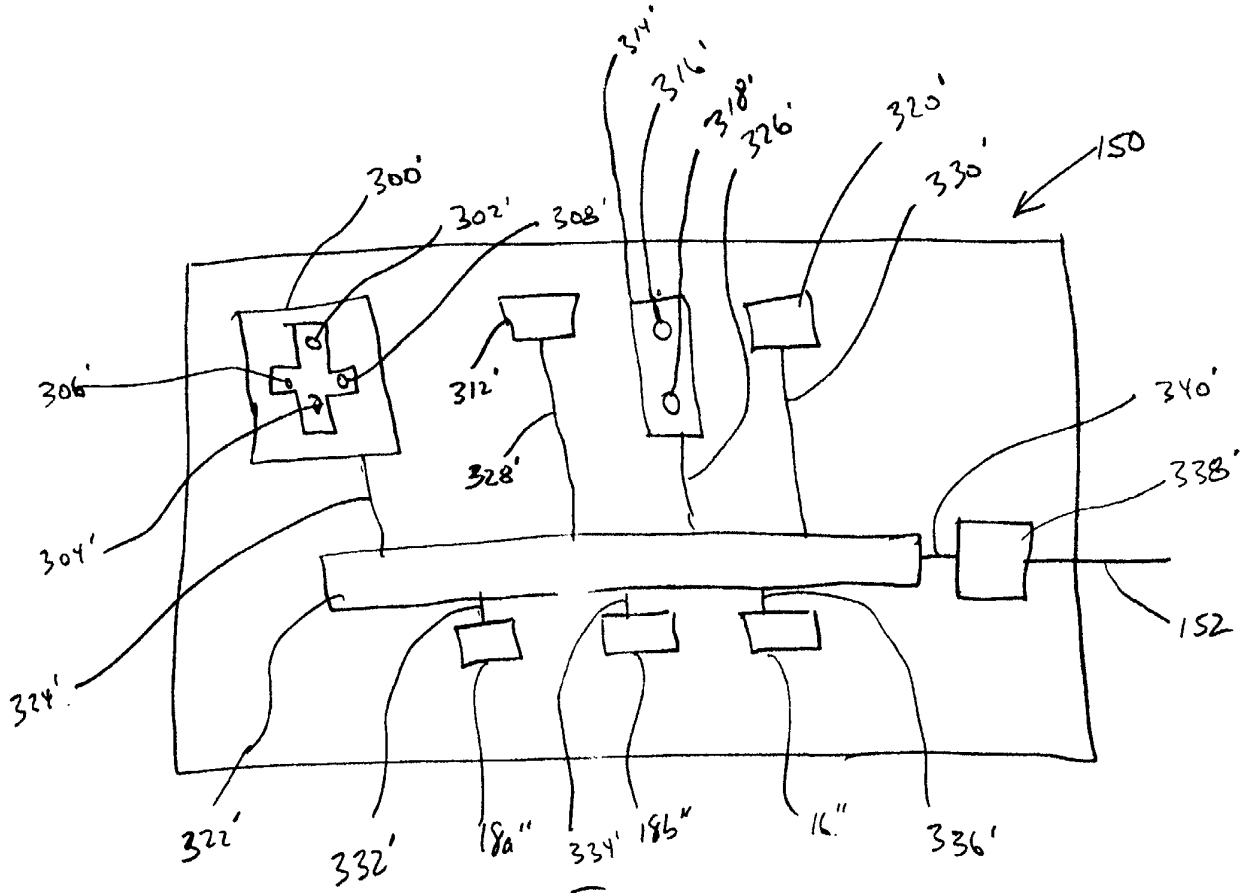


FIG. 12

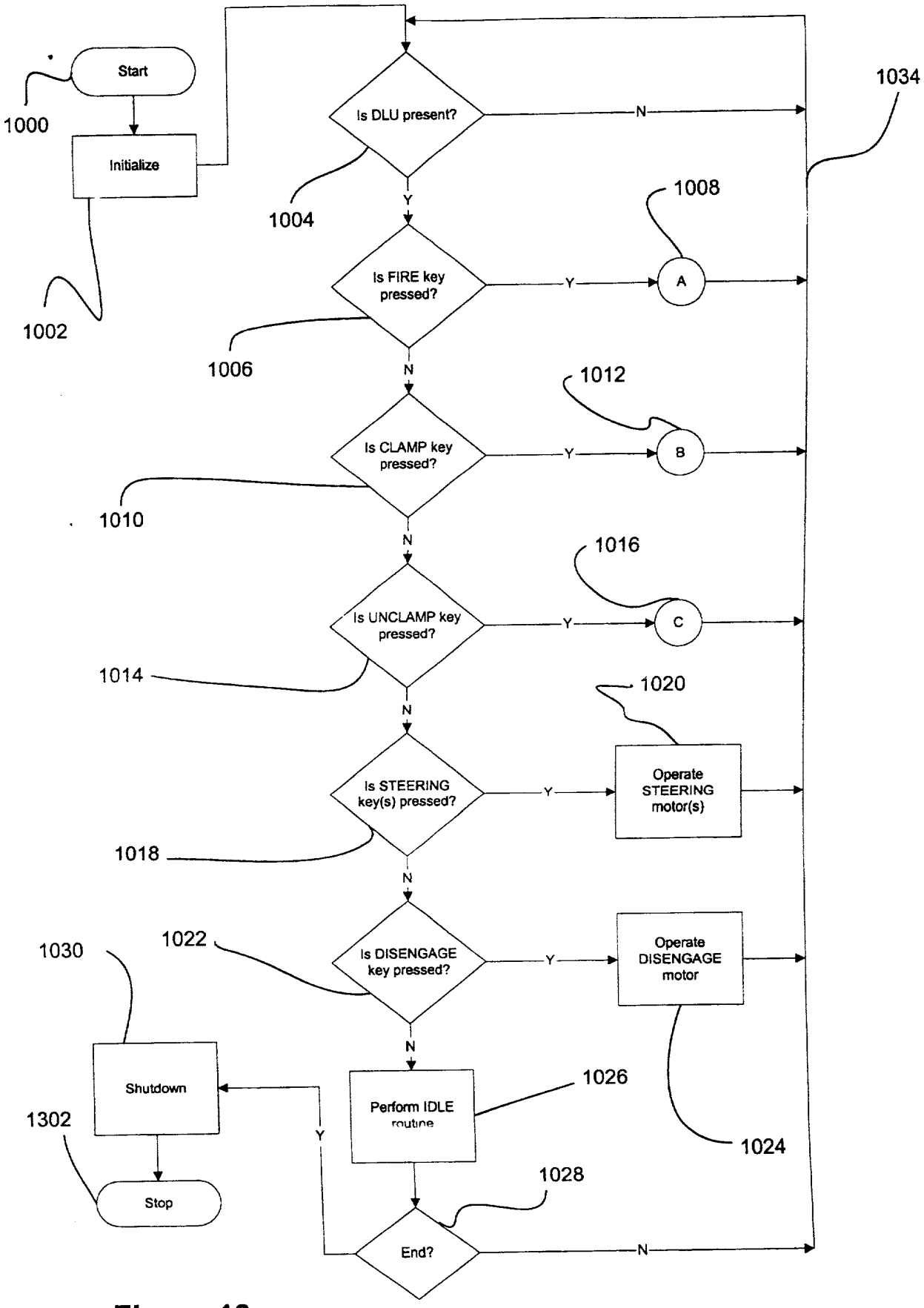

Start
1000
Initialize
1002
Is DLU present?
N
1034
1004
Y
1008
Is FIRE key pressed?
Y
A
1006
N
1012
Is CLAMP key pressed?
Y
B
1010
N
1016
Is UNCLAMP key pressed?
Y
C
1014
N
1020
Is STEERING key(s) pressed?
Y
Operate STEERING motor(s)
1018
N
1022
Is DISENGAGE key pressed?
Y
Operate DISENGAGE motor
1030
N
Shutdown
Perform IDLE routine
1026
1302
Y
1024
Stop
1028
End?
N

Figure 13

US 6,857,685 B2

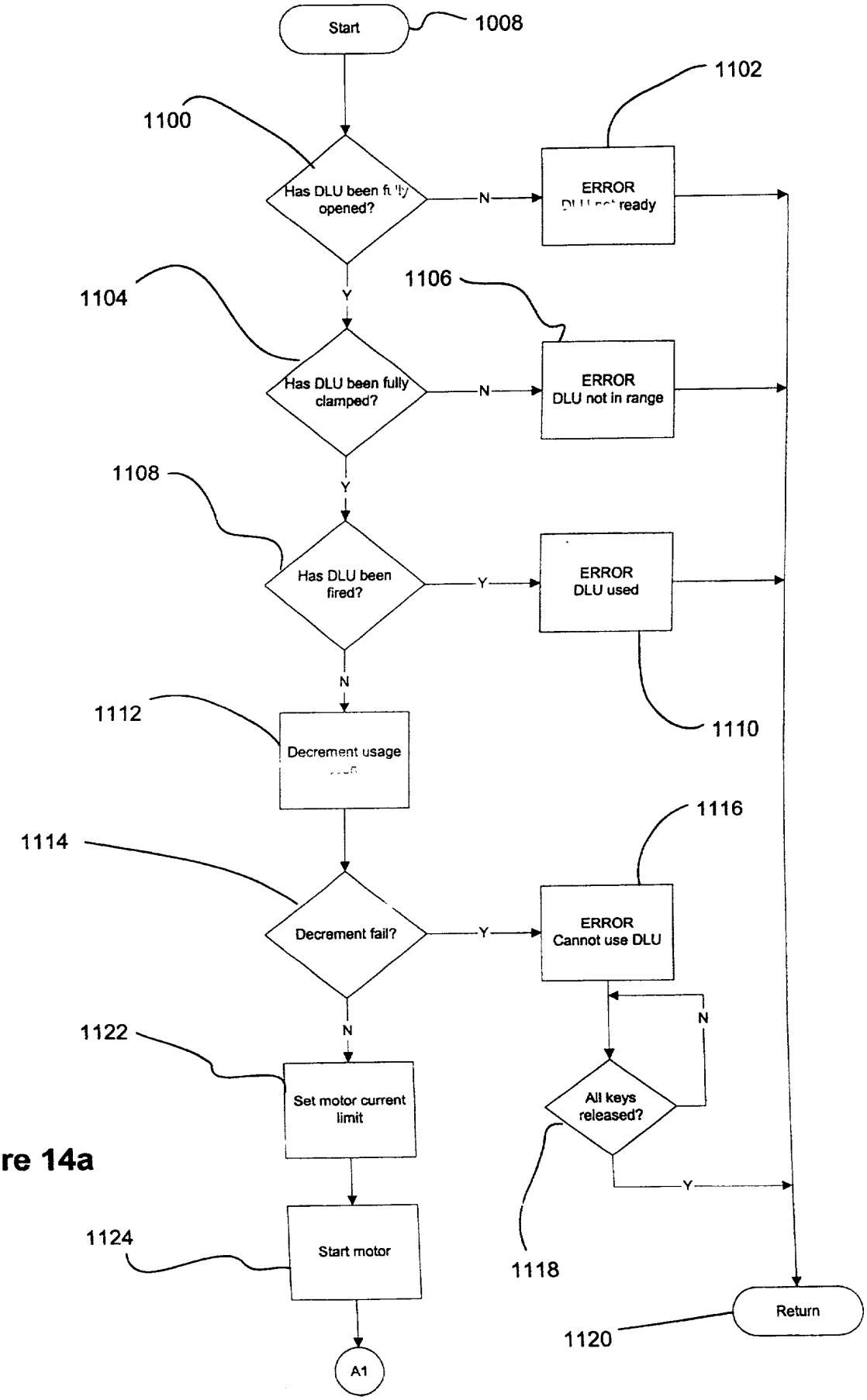


Figure 14a

FIGURE 14b - 96/76850

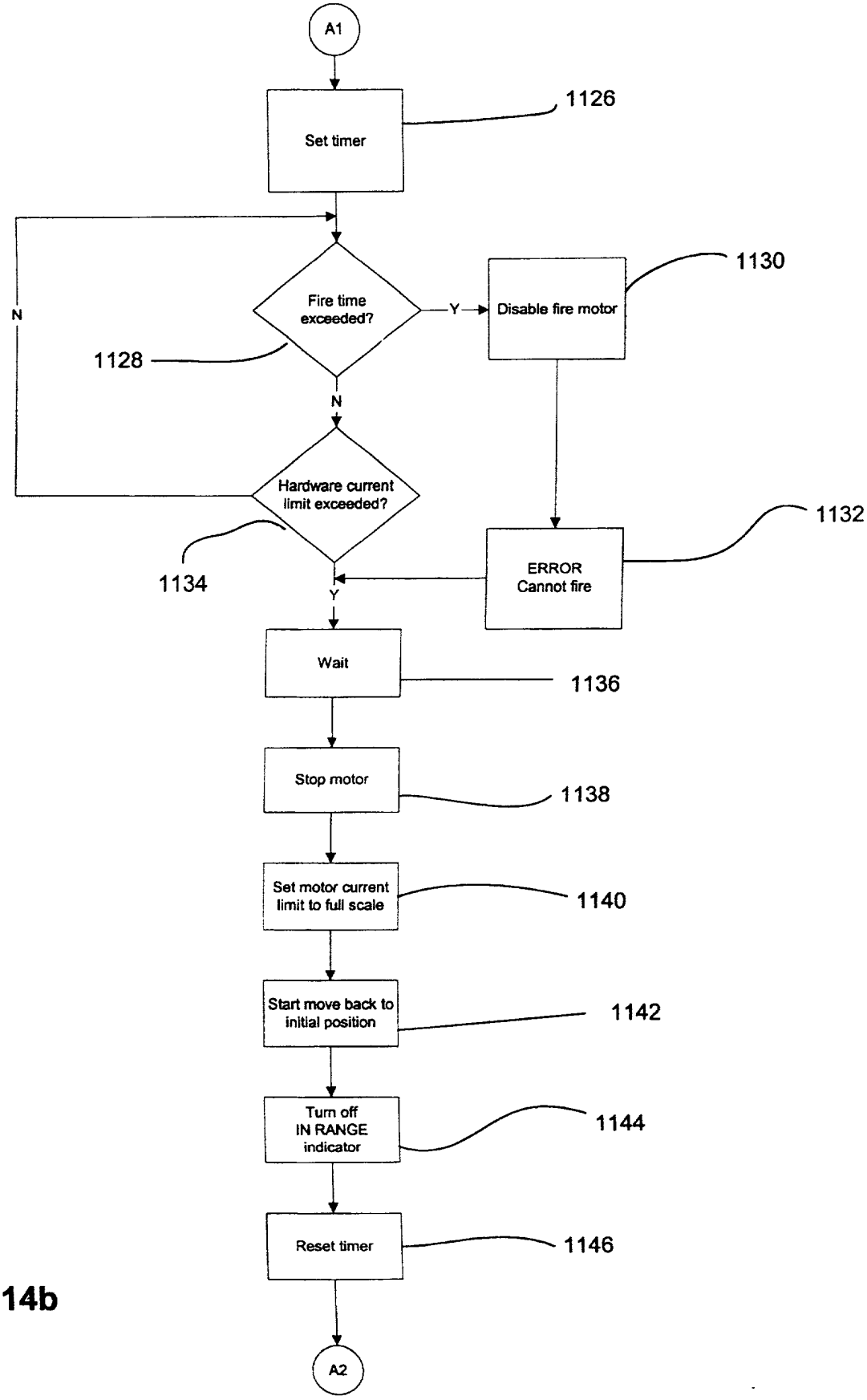


Figure 14b

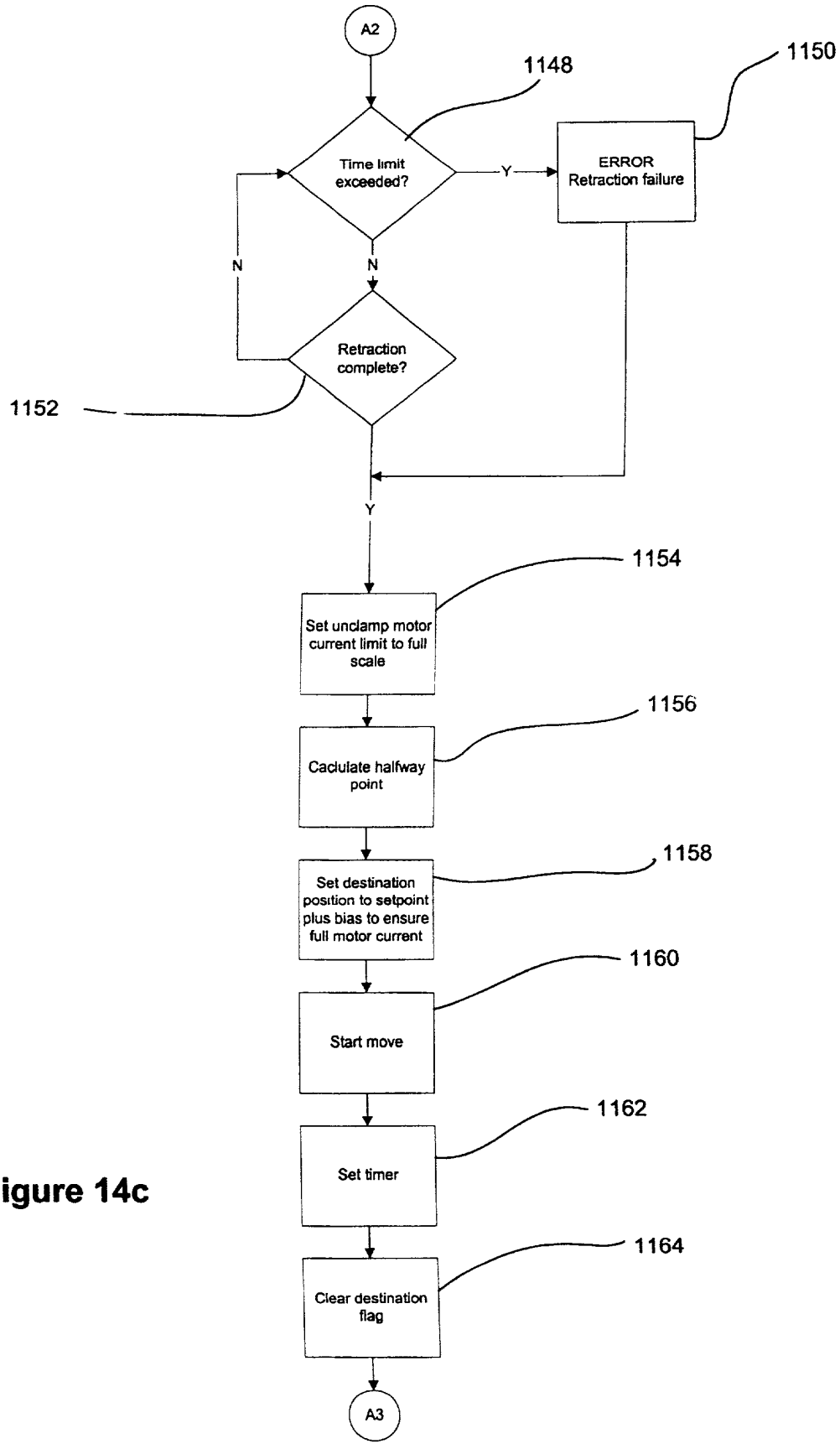

A2
1148
1150
Time limit exceeded?
Y
ERROR Retraction failure
N
N
Retraction complete?
1152
Y
1154
Set unclamp motor current limit to full scale
1156
Caclulate halfway point
1158
Set destination position to setpoint plus bias to ensure full motor current
1160
Start move
1162
Set timer
1164
Clear destination flag
A3

Figure 14c

US 6,968,928 B2

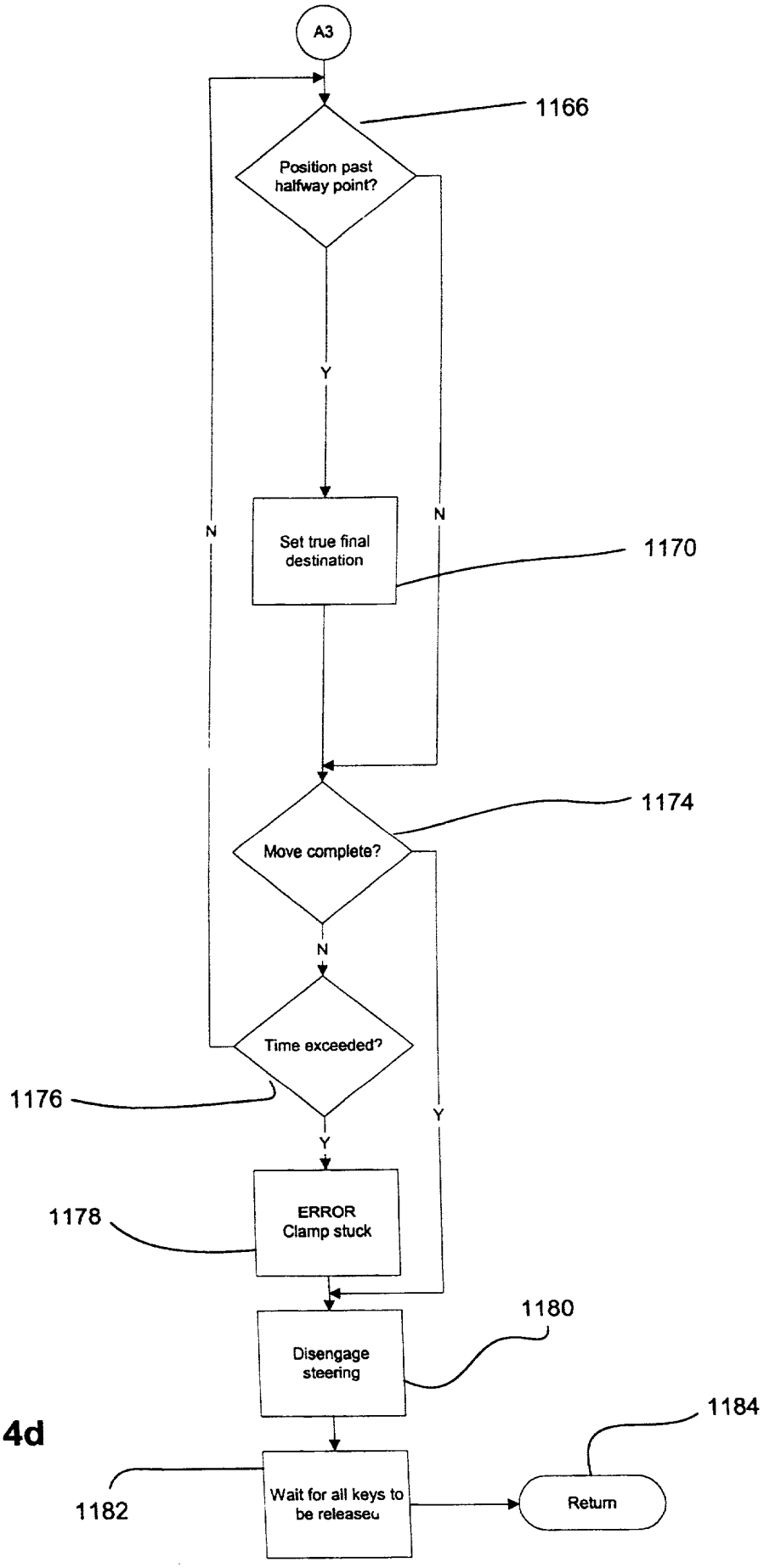


Figure 14d

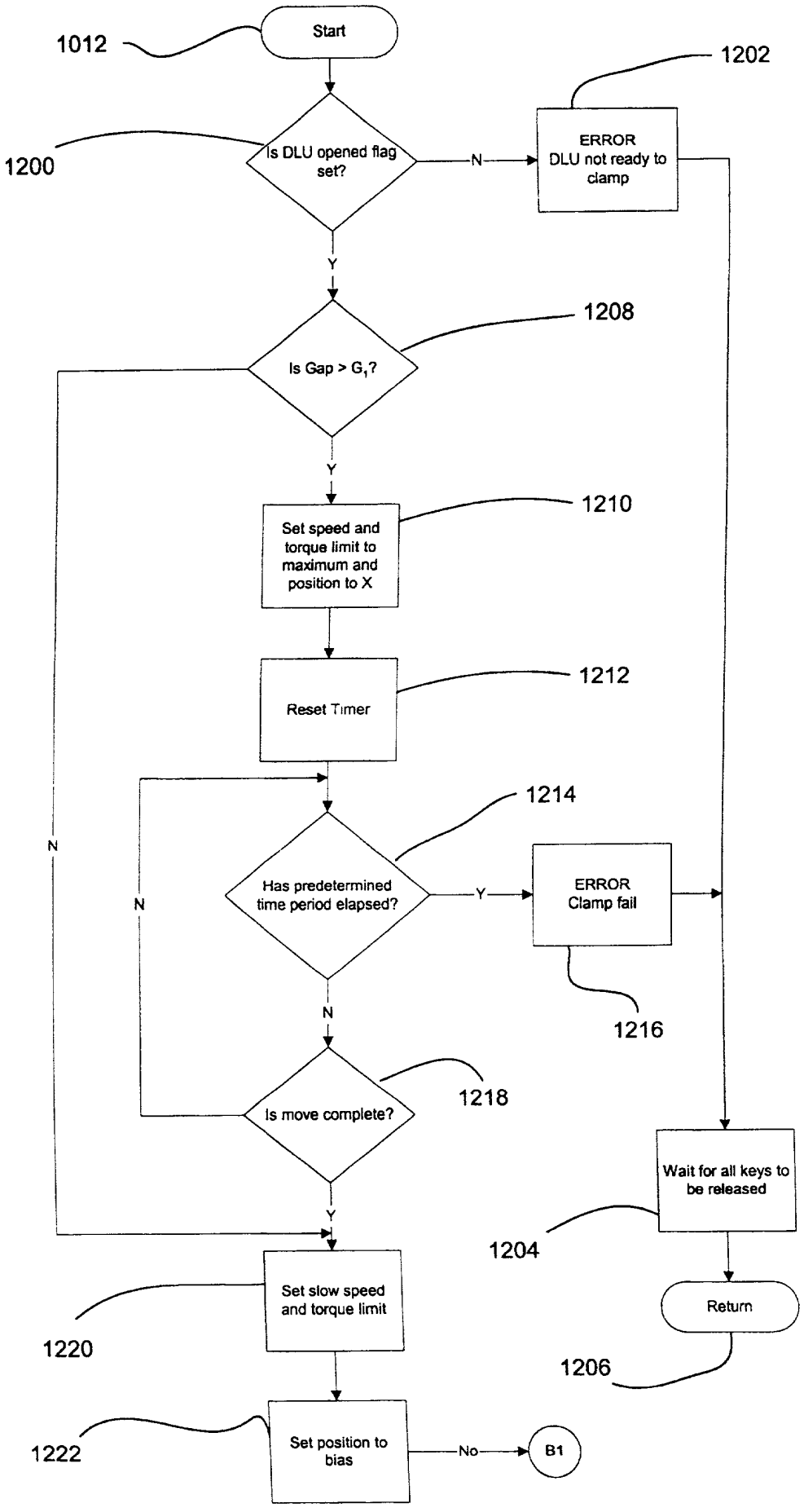

Start
1012
1202
ERROR
DLU not ready to clamp
1200
Is DLU opened flag set?
N
Y
1208
Is Gap > G1?
Y
1210
Set speed and torque limit to maximum and position to X
1212
Reset Timer
1214
Has predetermined time period elapsed?
Y
ERROR
Clamp fail
1216
N
N
N
1218
Is move complete?
Y
Wait for all keys to be released
1204
Return
1206
Set slow speed and torque limit
1220
Set position to bias
1222
No
B1

Figure 15a

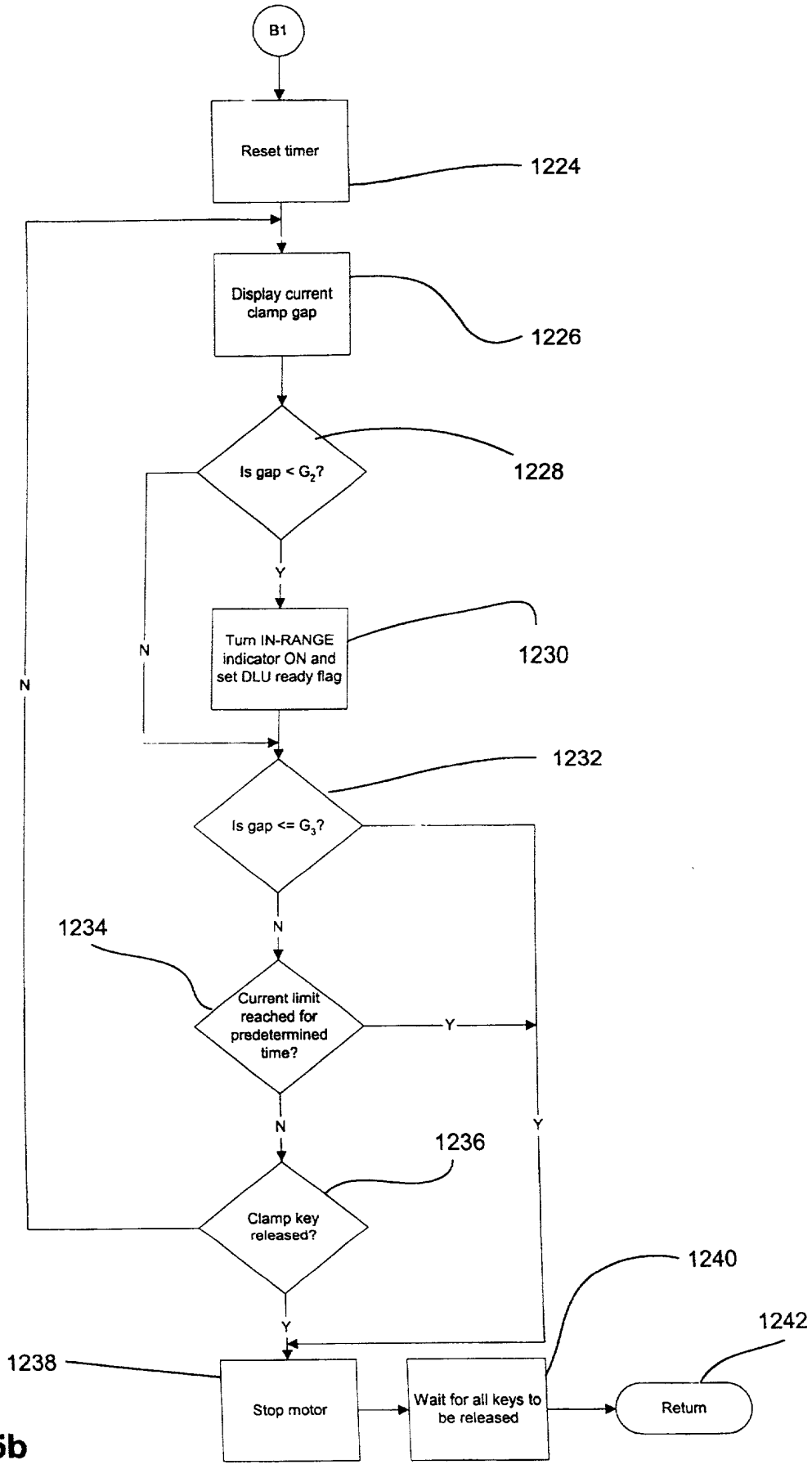

B1
Reset timer
1224
Display current clamp gap
1226
Is gap < G_2?
1228
Y
N
Turn IN-RANGE indicator ON and set DLU ready flag
1230
1232
Is gap <= G_3?
N
1234
Current limit reached for predetermined time?
Y
N
Y
1236
Clamp key released?
Y
1240
1242
1238
Stop motor
Wait for all keys to be released
Return

Figure 15b

TOSHIBA 6A7/6B6/6B6A

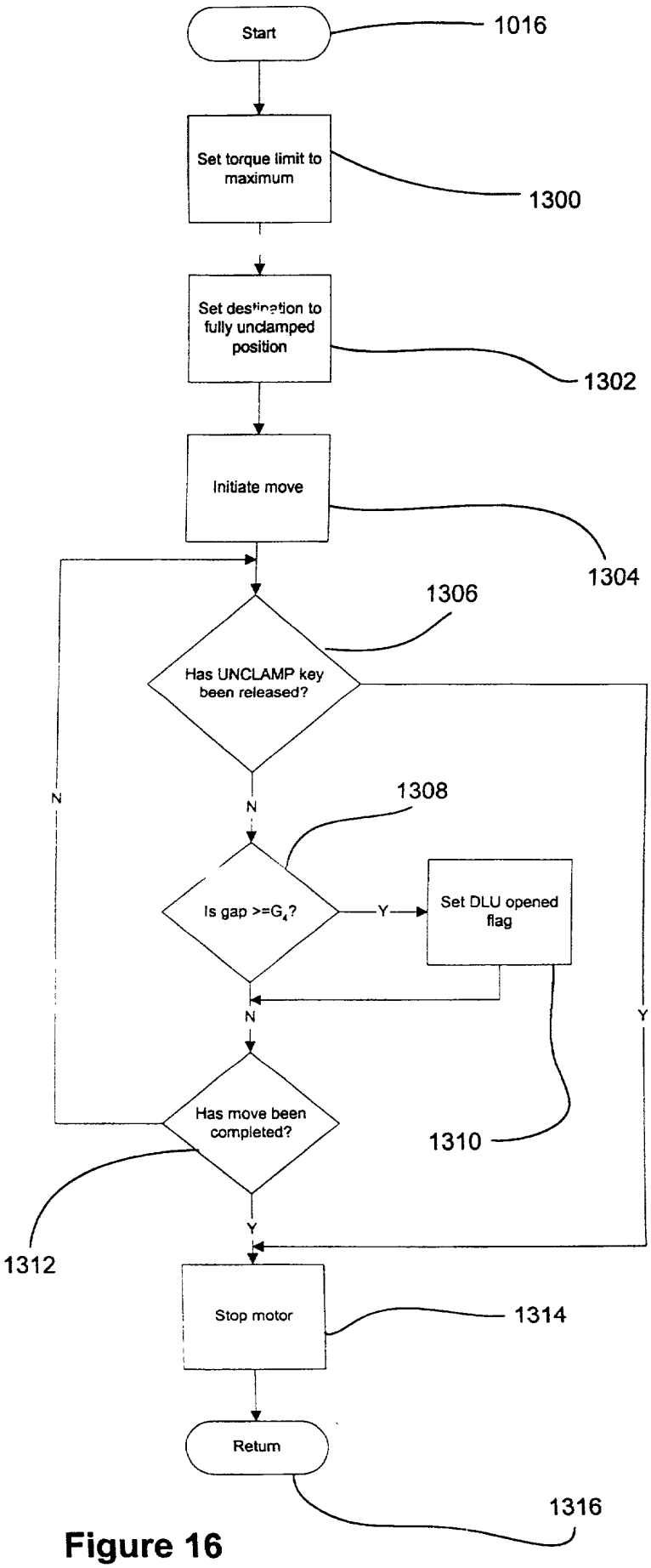


Figure 16

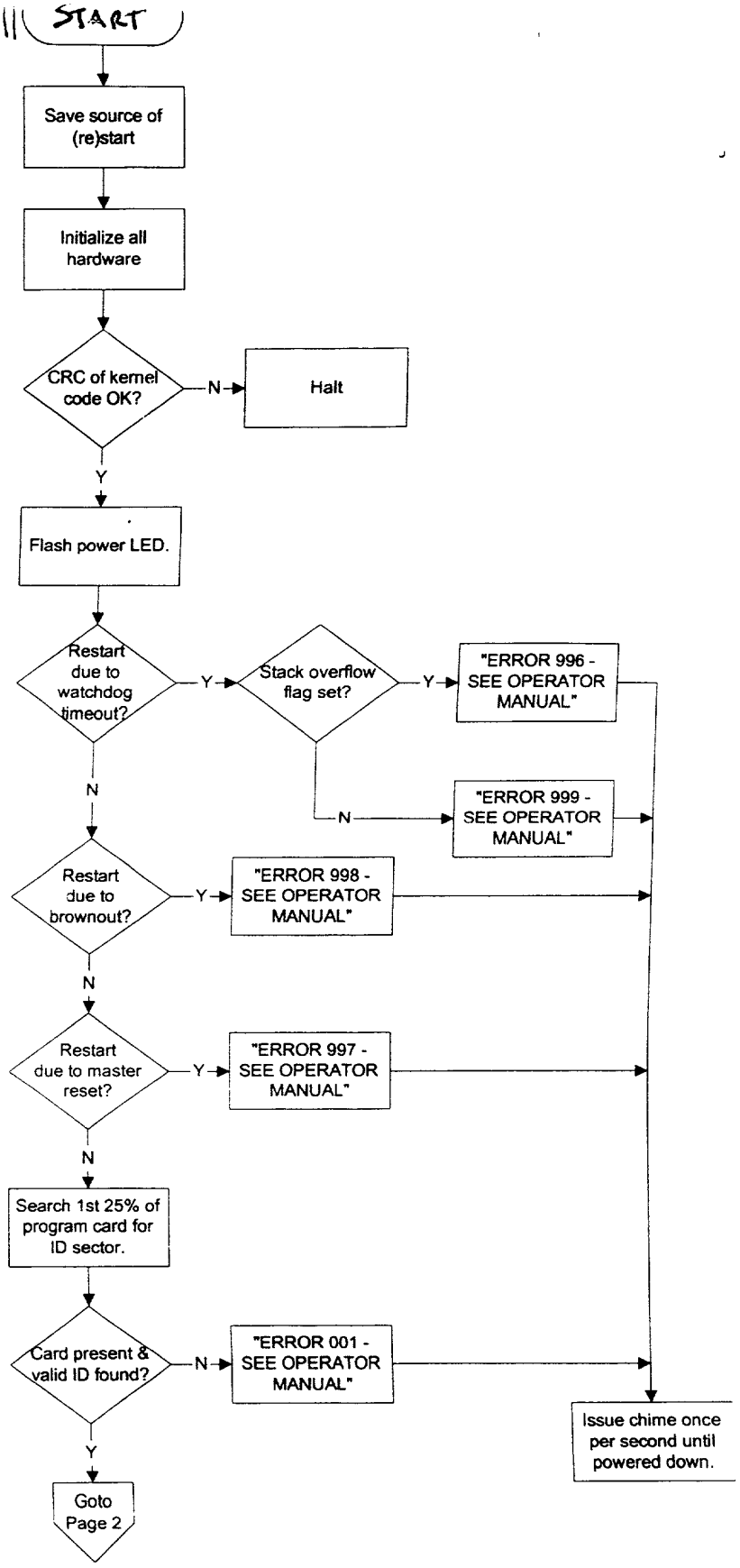

START
Save source of (re)start
Initialize all hardware
CRC of kernel code OK?
N
Halt
Y
Flash power LED.
Restart due to watchdog timeout?
Y
Stack overflow flag set?
Y
"ERROR 996 - SEE OPERATOR MANUAL"
N
"ERROR 999 - SEE OPERATOR MANUAL"
N
Restart due to brownout?
Y
"ERROR 998 - SEE OPERATOR MANUAL"
N
Restart due to master reset?
Y
"ERROR 997 - SEE OPERATOR MANUAL"
N
Search 1st 25% of program card for ID sector.
Card present & valid ID found?
N
"ERROR 001 - SEE OPERATOR MANUAL"
Y
Goto Page 2
Issue chime once per second until powered down.

FIG. 19a

US 6,567,536 B1

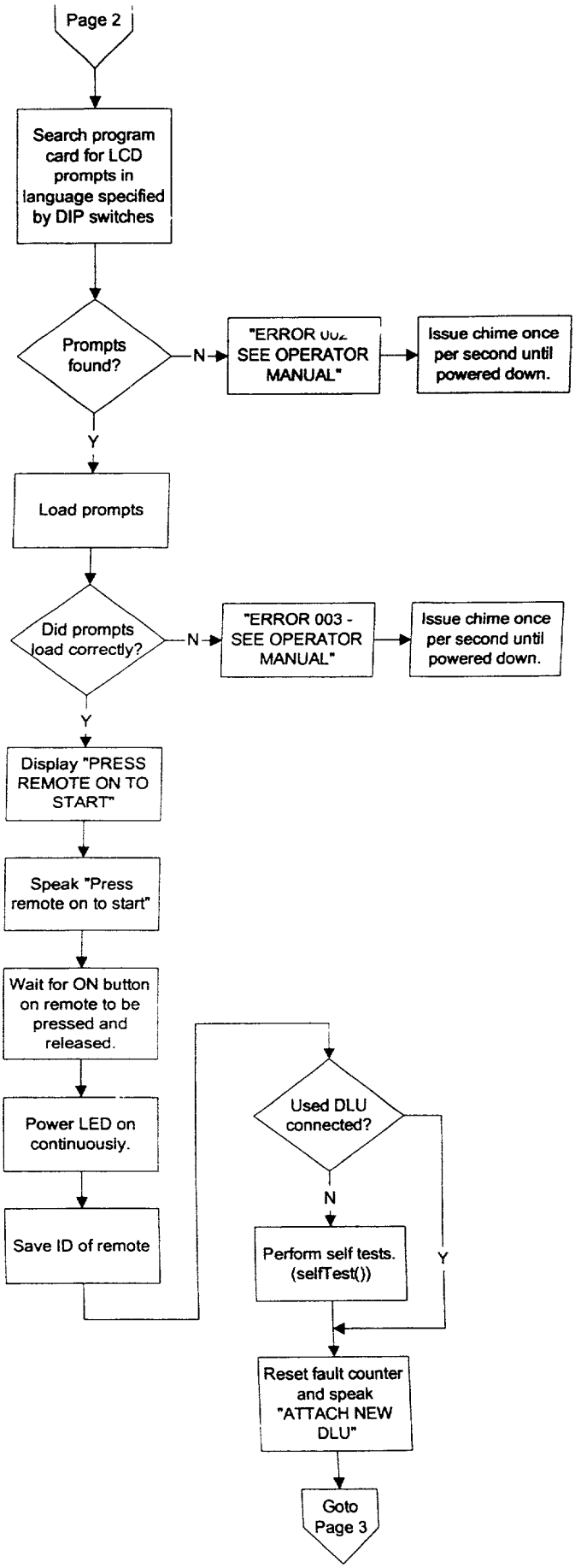


FIG. 17b

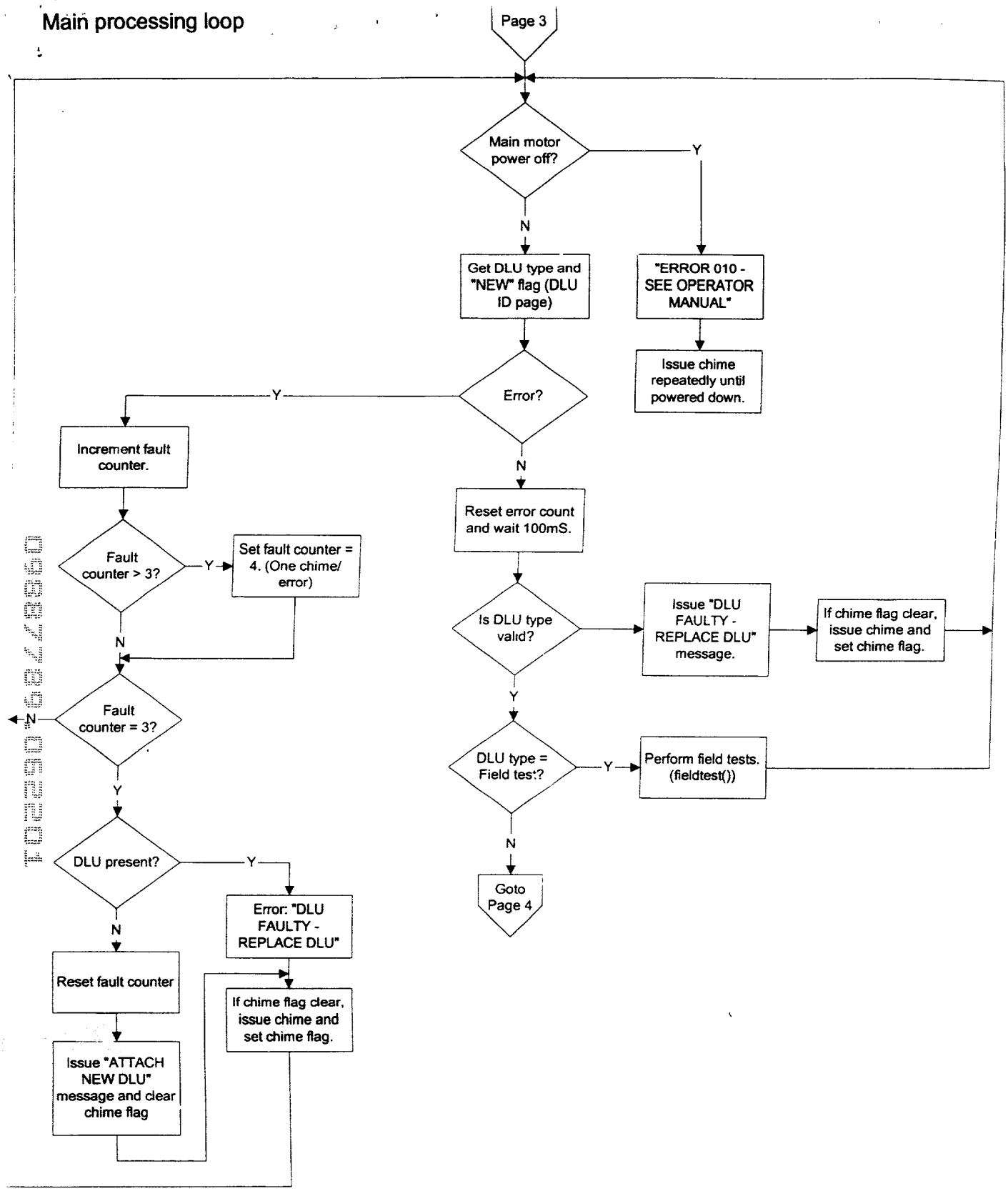

Main processing loop
Page 3
Main motor power off?
Y
N
Get DLU type and "NEW" flag (DLU ID page)
"ERROR 010 - SEE OPERATOR MANUAL"
Issue chime repeatedly until powered down.
Error?
Y
N
Increment fault counter.
Reset error count and wait 100mS.
Fault counter > 3?
Y
Set fault counter = 4. (One chime/ error)
N
Is DLU type valid?
Issue "DLU FAULTY - REPLACE DLU" message.
If chime flag clear, issue chime and set chime flag.
Y
Fault counter = 3?
N
Y
DLU type = Field test?
Y
Perform field tests. (fieldtest())
N
Goto Page 4
DLU present?
Y
N
Error: "DLU FAULTY - REPLACE DLU"
Reset fault counter
If chime flag clear, issue chime and set chime flag.
Issue "ATTACH NEW DLU" message and clear chime flag

FIG. 19c

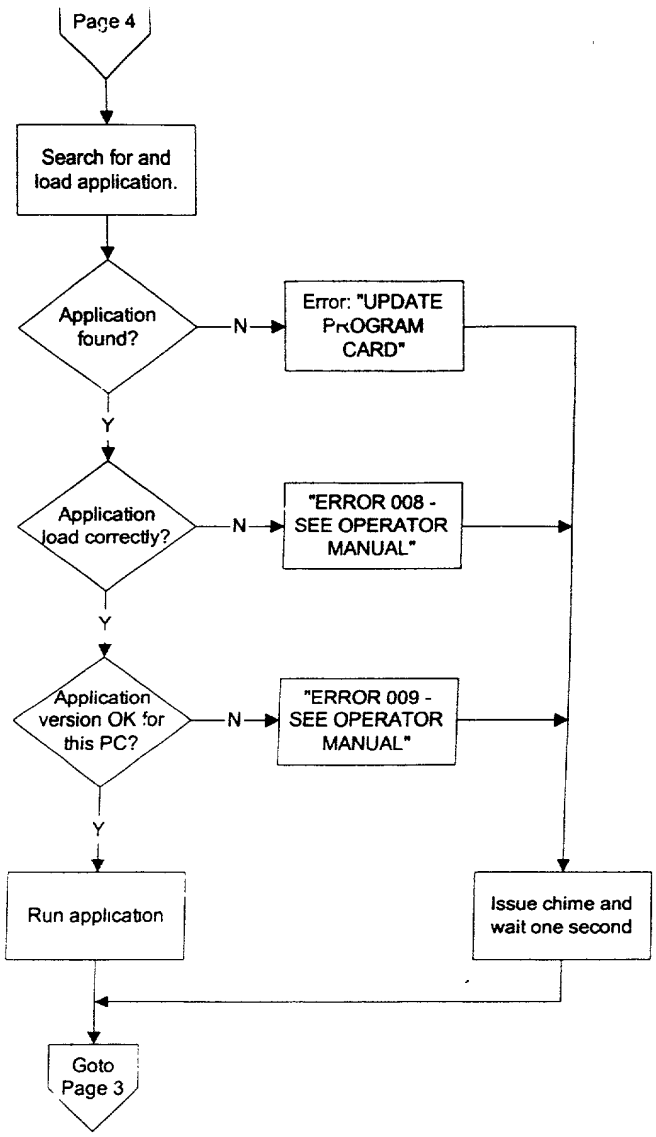

Page 4
Search for and load application.
Application found?
N
Error: "UPDATE PROGRAM CARD"
Y
Application load correctly?
N
"ERROR 008 - SEE OPERATOR MANUAL"
Y
Application version OK for this PC?
N
"ERROR 009 - SEE OPERATOR MANUAL"
Y
Run application
Issue chime and wait one second
Goto Page 3

FIG. 17d

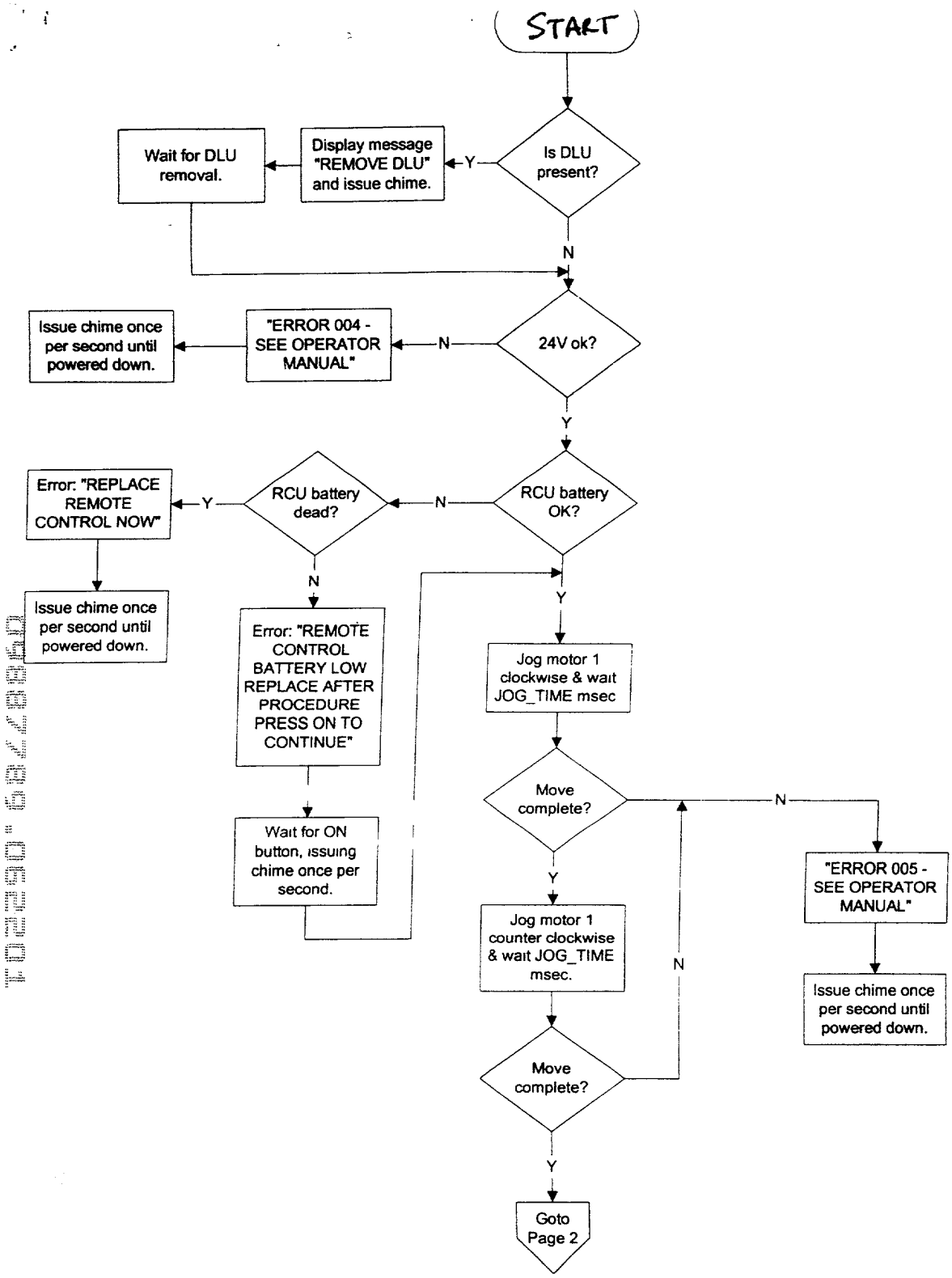

START
Is DLU present?
Y
Display message "REMOVE DLU" and issue chime.
Wait for DLU removal.
N
24V ok?
N
"ERROR 004 - SEE OPERATOR MANUAL"
Issue chime once per second until powered down.
Y
RCU battery OK?
N
RCU battery dead?
Y
Error: "REPLACE REMOTE CONTROL NOW"
Issue chime once per second until powered down.
N
Error: "REMOTE CONTROL BATTERY LOW REPLACE AFTER PROCEDURE PRESS ON TO CONTINUE"
Wait for ON button, issuing chime once per second.
Y
Jog motor 1 clockwise & wait JOG_TIME msec
Move complete?
N
"ERROR 005 - SEE OPERATOR MANUAL"
Issue chime once per second until powered down.
Y
Jog motor 1 counter clockwise & wait JOG_TIME msec.
Move complete?
N
Y
Goto Page 2

FIG. 18a

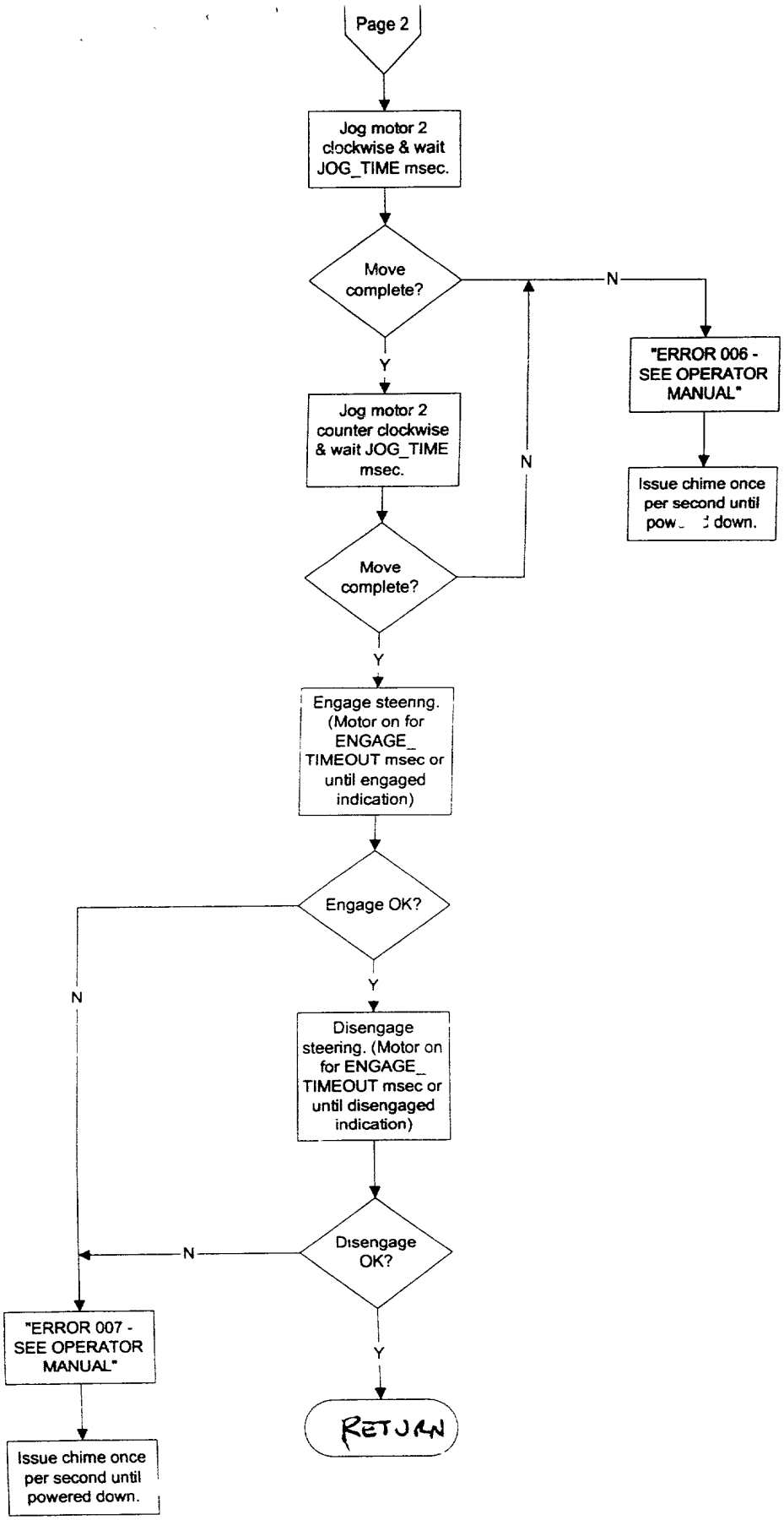

Page 2
Jog motor 2 clockwise & wait JOG_TIME msec.
Move complete?
N
Y
"ERROR 006 - SEE OPERATOR MANUAL"
Issue chime once per second until pow_ : down.
Jog motor 2 counter clockwise & wait JOG_TIME msec.
N
Move complete?
Y
Engage steenng. (Motor on for ENGAGE_ TIMEOUT msec or until engaged indication)
Engage OK?
N
Y
Disengage steering. (Motor on for ENGAGE_ TIMEOUT msec or until disengaged indication)
Disengage OK?
N
Y
"ERROR 007 - SEE OPERATOR MANUAL"
Issue chime once per second until powered down.
RETURN

FIG. 18b

US 6,687,569 B2

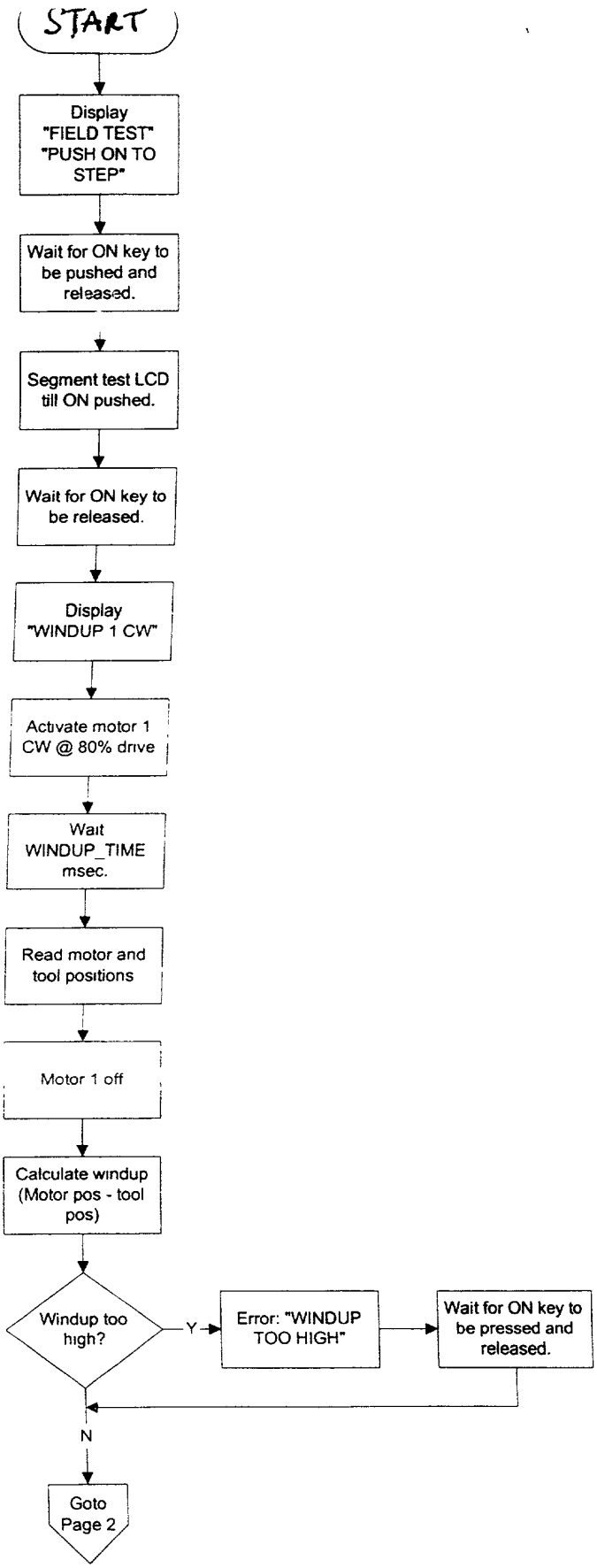


FIG. 19a

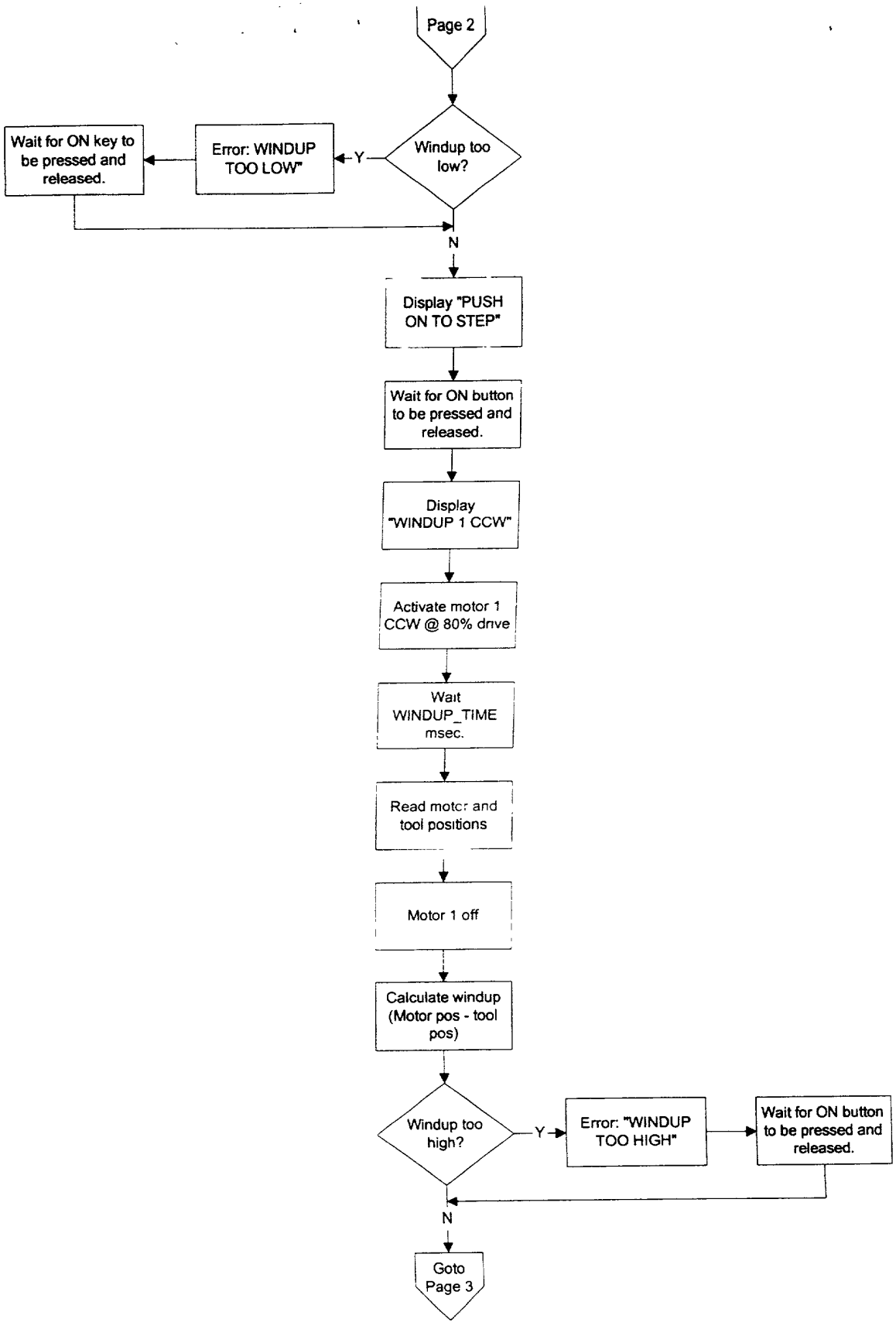

Page 2
Windup too low?
Y
Error: WINDUP TOO LOW"
Wait for ON key to be pressed and released.
N
Display "PUSH ON TO STEP"
Wait for ON button to be pressed and released.
Display "WINDUP 1 CCW"
Activate motor 1 CCW @ 80% drive
Wait WINDUP_TIME msec.
Read motor and tool positions
Motor 1 off
Calculate windup (Motor pos - tool pos)
Windup too high?
Y
Error: "WINDUP TOO HIGH"
Wait for ON button to be pressed and released.
N
Goto Page 3

FIG. 19b

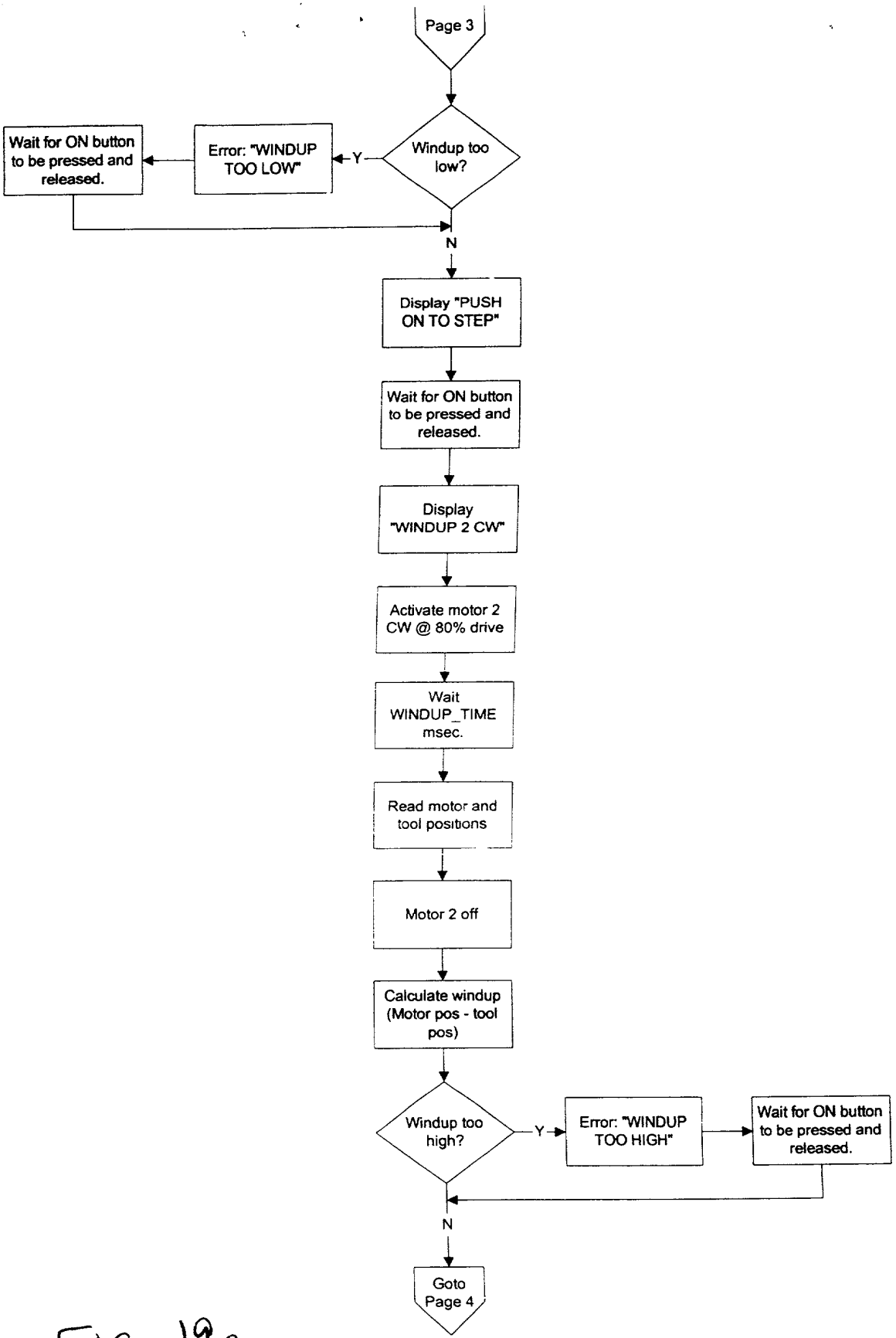

Page 3
Windup too low?
Y
Error: "WINDUP TOO LOW"
Wait for ON button to be pressed and released.
N
Display "PUSH ON TO STEP"
Wait for ON button to be pressed and released.
Display "WINDUP 2 CW"
Activate motor 2 CW @ 80% drive
Wait WINDUP_TIME msec.
Read motor and tool positions
Motor 2 off
Calculate windup (Motor pos - tool pos)
Windup too high?
Y
Error: "WINDUP TOO HIGH"
Wait for ON button to be pressed and released.
N
Goto Page 4

FIG. 19c

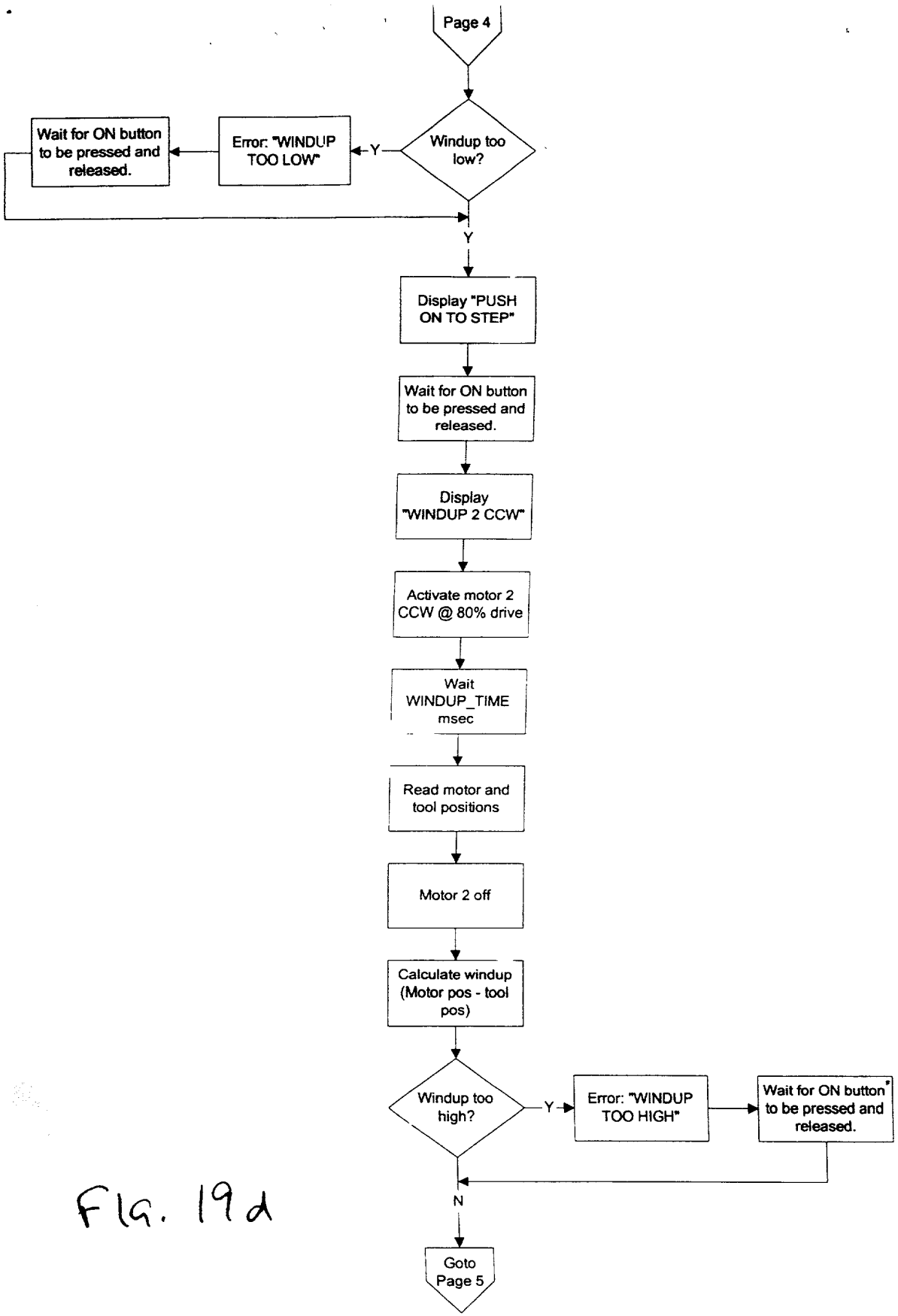

Page 4
Windup too low?
Y
Error: "WINDUP TOO LOW"
Wait for ON button to be pressed and released.
Y
Display "PUSH ON TO STEP"
Wait for ON button to be pressed and released.
Display "WINDUP 2 CCW"
Activate motor 2 CCW @ 80% drive
Wait WINDUP_TIME msec
Read motor and tool positions
Motor 2 off
Calculate windup (Motor pos - tool pos)
Windup too high?
Y
Error: "WINDUP TOO HIGH"
Wait for ON button to be pressed and released.
N
Goto Page 5

Fig. 19d

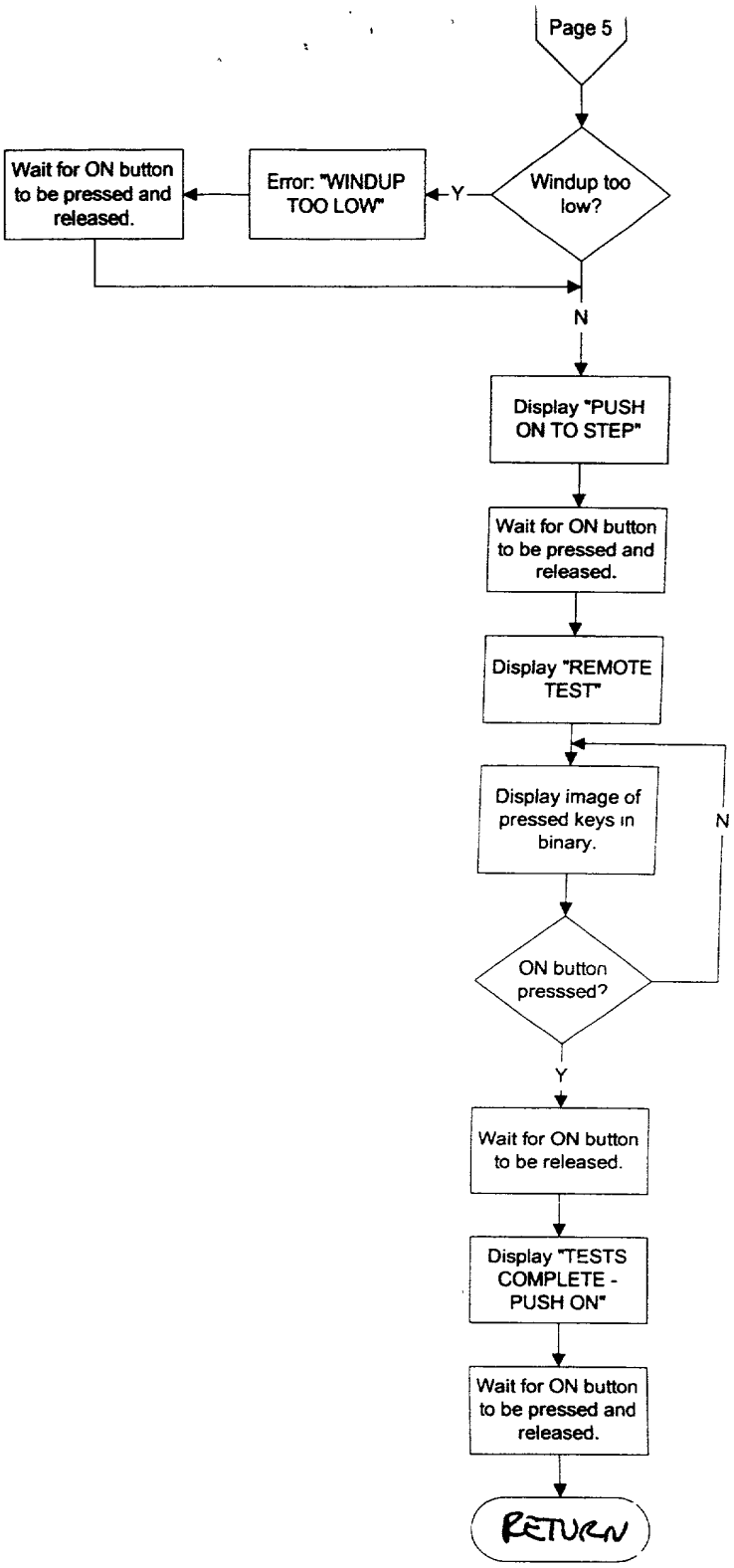

Page 5
Windup too low?
Y
Error: "WINDUP TOO LOW"
Wait for ON button to be pressed and released.
N
Display "PUSH ON TO STEP"
Wait for ON button to be pressed and released.
Display "REMOTE TEST"
Display image of pressed keys in binary.
N
ON button presssed?
Y
Wait for ON button to be released.
Display "TESTS COMPLETE - PUSH ON"
Wait for ON button to be pressed and released.
RETURN

FIG. 19e

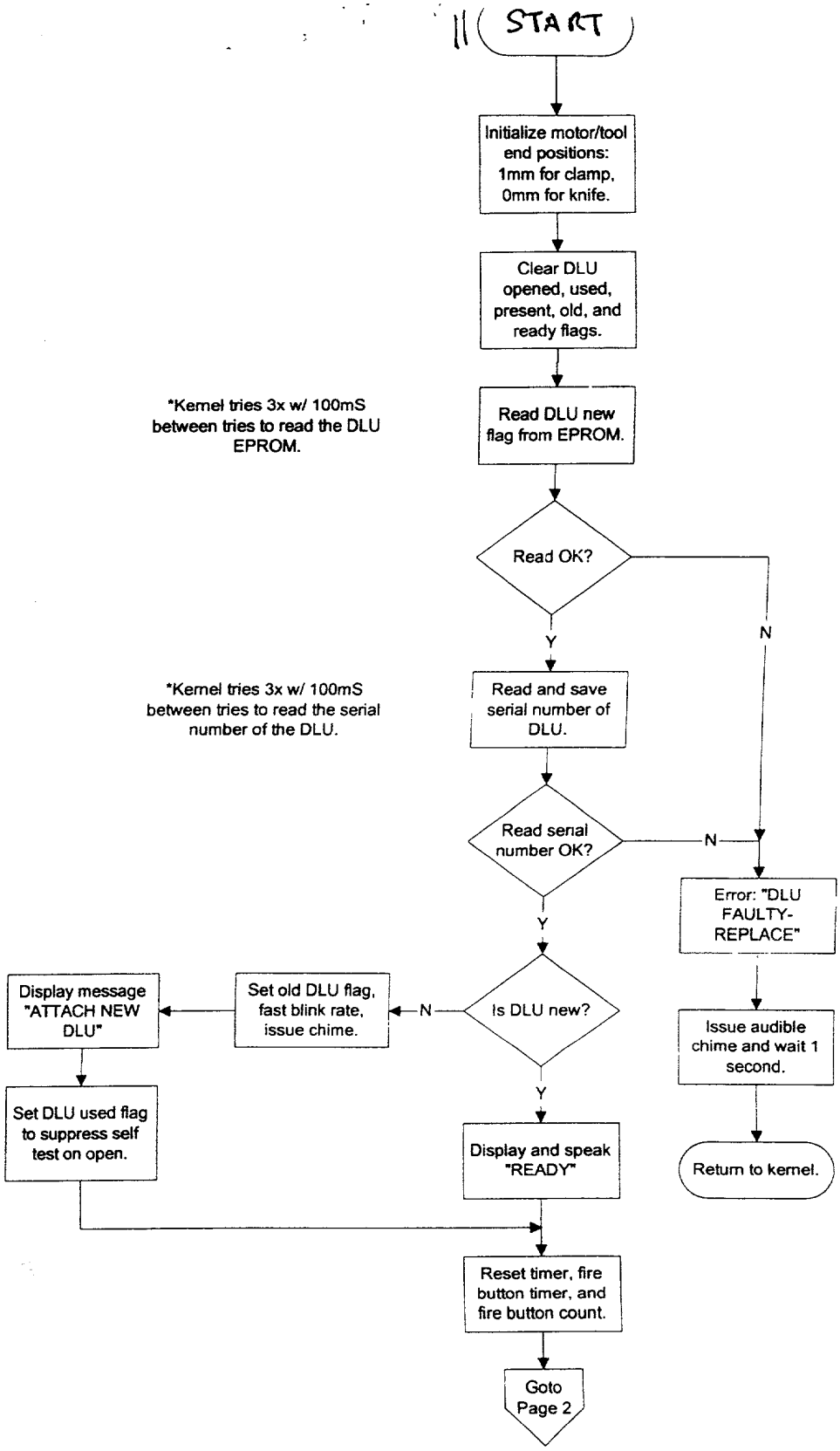

START
Initialize motor/tool end positions: 1mm for clamp, 0mm for knife.
Clear DLU opened, used, present, old, and ready flags.
*Kernel tries 3x w/ 100mS between tries to read the DLU EPROM.
Read DLU new flag from EPROM.
Read OK?
Y
N
*Kernel tries 3x w/ 100mS between tries to read the serial number of the DLU.
Read and save serial number of DLU.
Read serial number OK?
N
Y
Error: "DLU FAULTY-REPLACE"
Issue audible chime and wait 1 second.
Return to kernel.
Is DLU new?
N
Y
Set old DLU flag, fast blink rate, issue chime.
Display message "ATTACH NEW DLU"
Set DLU used flag to suppress self test on open.
Display and speak "READY"
Reset timer, fire button timer, and fire button count.
Goto Page 2

FIG. 20a

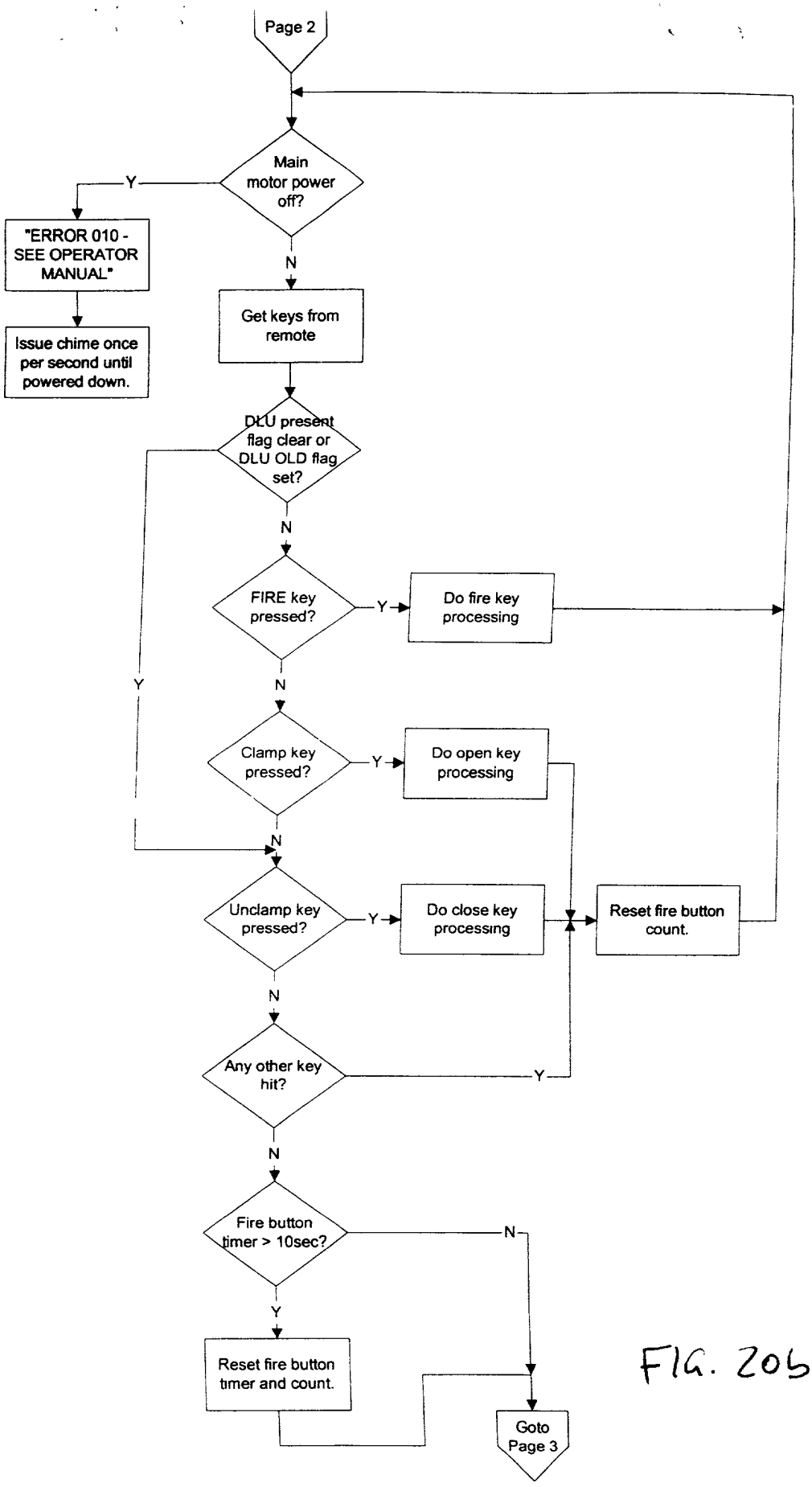

Page 2
Main motor power off?
Y
"ERROR 010 - SEE OPERATOR MANUAL"
Issue chime once per second until powered down.
N
Get keys from remote
DLU present flag clear or DLU OLD flag set?
N
FIRE key pressed?
Y
Do fire key processing
Y
N
Clamp key pressed?
Y
Do open key processing
N
Unclamp key pressed?
Y
Do close key processing
Reset fire button count.
N
Any other key hit?
Y
N
Fire button timer > 10sec?
N
Y
Reset fire button timer and count.
Goto Page 3

FIG. 20b

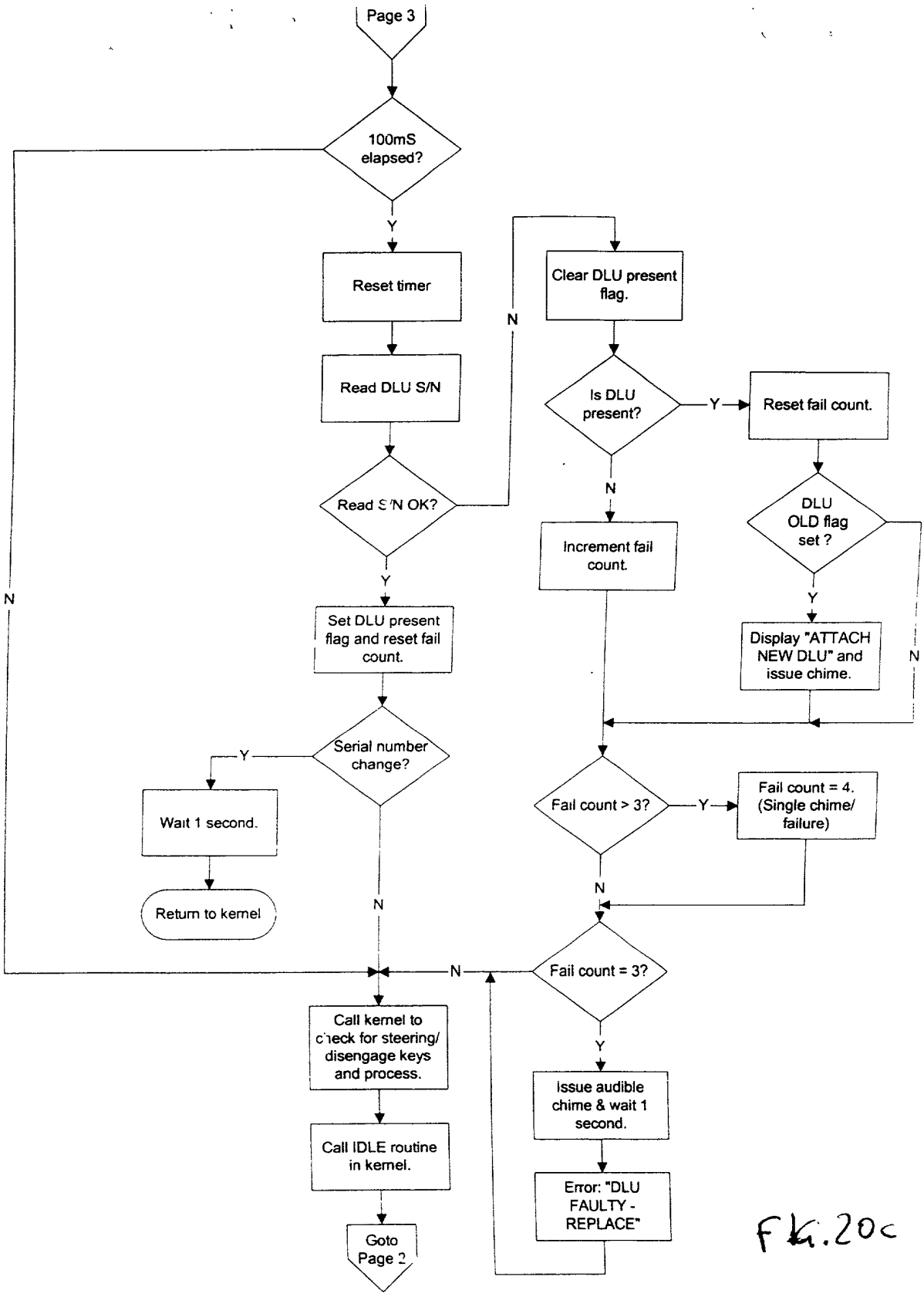

Page 3
100mS elapsed?
Y
N
Reset timer
Read DLU S/N
Read S/N OK?
Y
N
Set DLU present flag and reset fail count.
Serial number change?
Y
Wait 1 second.
Return to kernel
N
Call kernel to check for steering/ disengage keys and process.
Call IDLE routine in kernel.
Goto Page 2
Clear DLU present flag.
Is DLU present?
Y
Reset fail count.
N
Increment fail count.
DLU OLD flag set ?
Y
Display "ATTACH NEW DLU" and issue chime.
N
Fail count > 3?
Y
Fail count = 4. (Single chime/ failure)
N
Fail count = 3?
N
Y
Issue audible chime & wait 1 second.
Error: "DLU FAULTY - REPLACE"

Fig. 20c

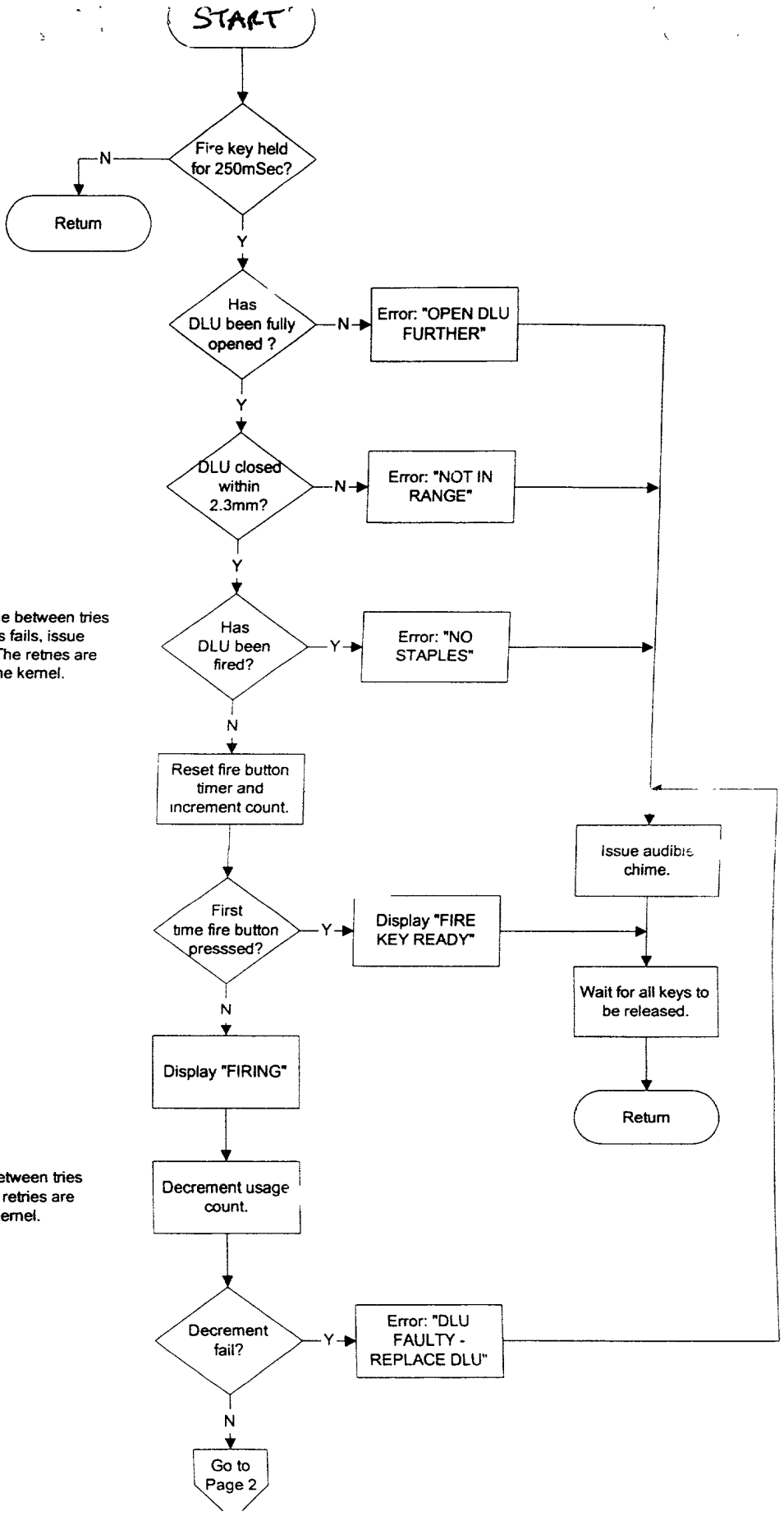
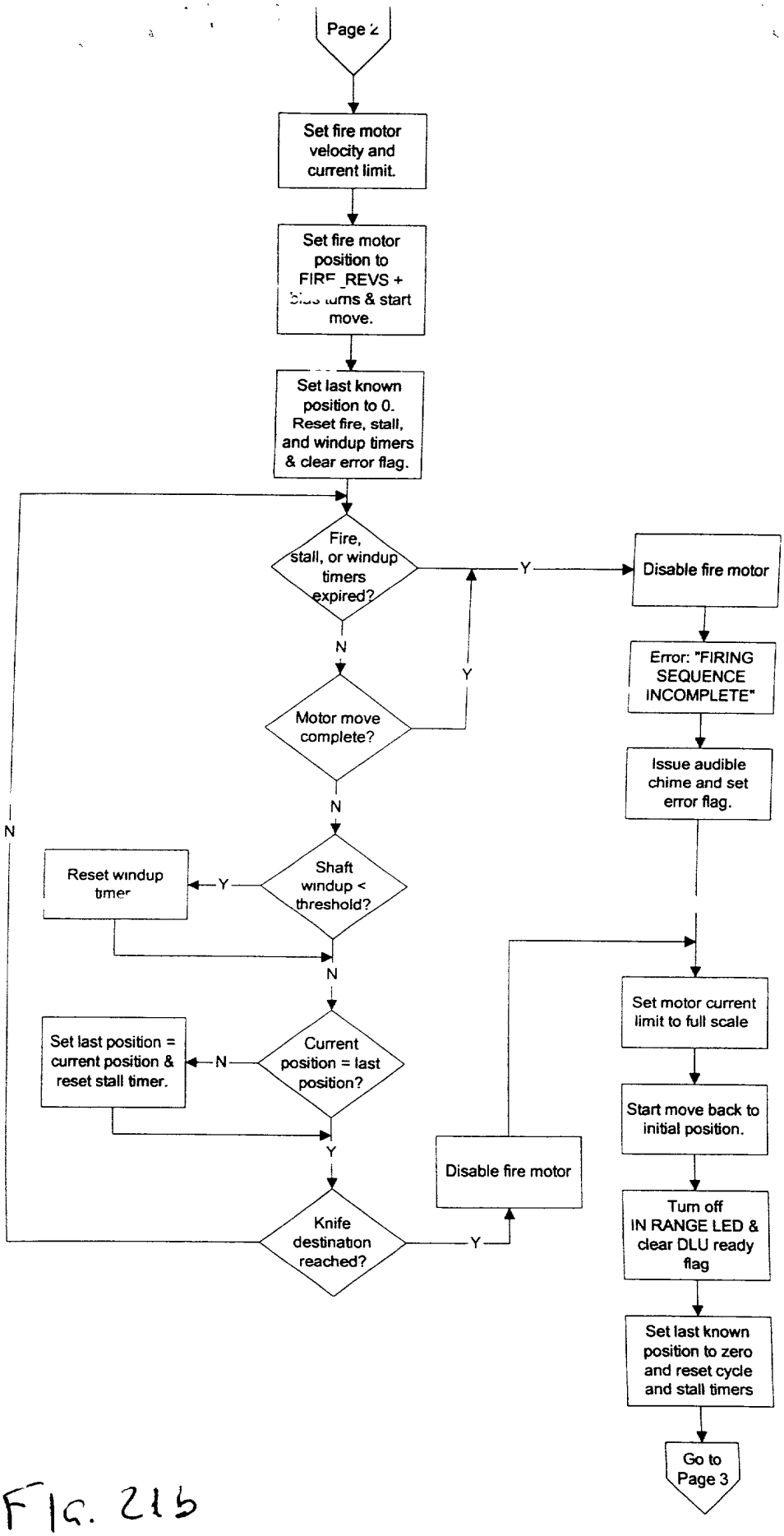

START
Fire key held for 250mSec?
N
Return
Y
Has DLU been fully opened ?
N
Error: "OPEN DLU FURTHER"
Y
DLU closed within 2.3mm?
N
Error: "NOT IN RANGE"
Y
Has DLU been fired?
Y
Error: "NO STAPLES"
N
Reset fire button timer and increment count.
First time fire button presssed?
Y
Display "FIRE KEY READY"
N
Display "FIRING"
Issue audible chime.
Wait for all keys to be released.
Return
Decrement usage count.
Decrement fail?
Y
Error: "DLU FAULTY - REPLACE DLU"
N
Go to Page 2
*Try 3x w/ 100mS time between tries to read DLU. If this fails, issue message and exit. The retnes are performed by the kernel.
*Try 3x w/ 100mS time between tries to decrement DLU. The retries are performed by the kernel.

FIG. 21a



Windup threshold is defined as SHAFT_WINDUP_MAX

Fig. 21b

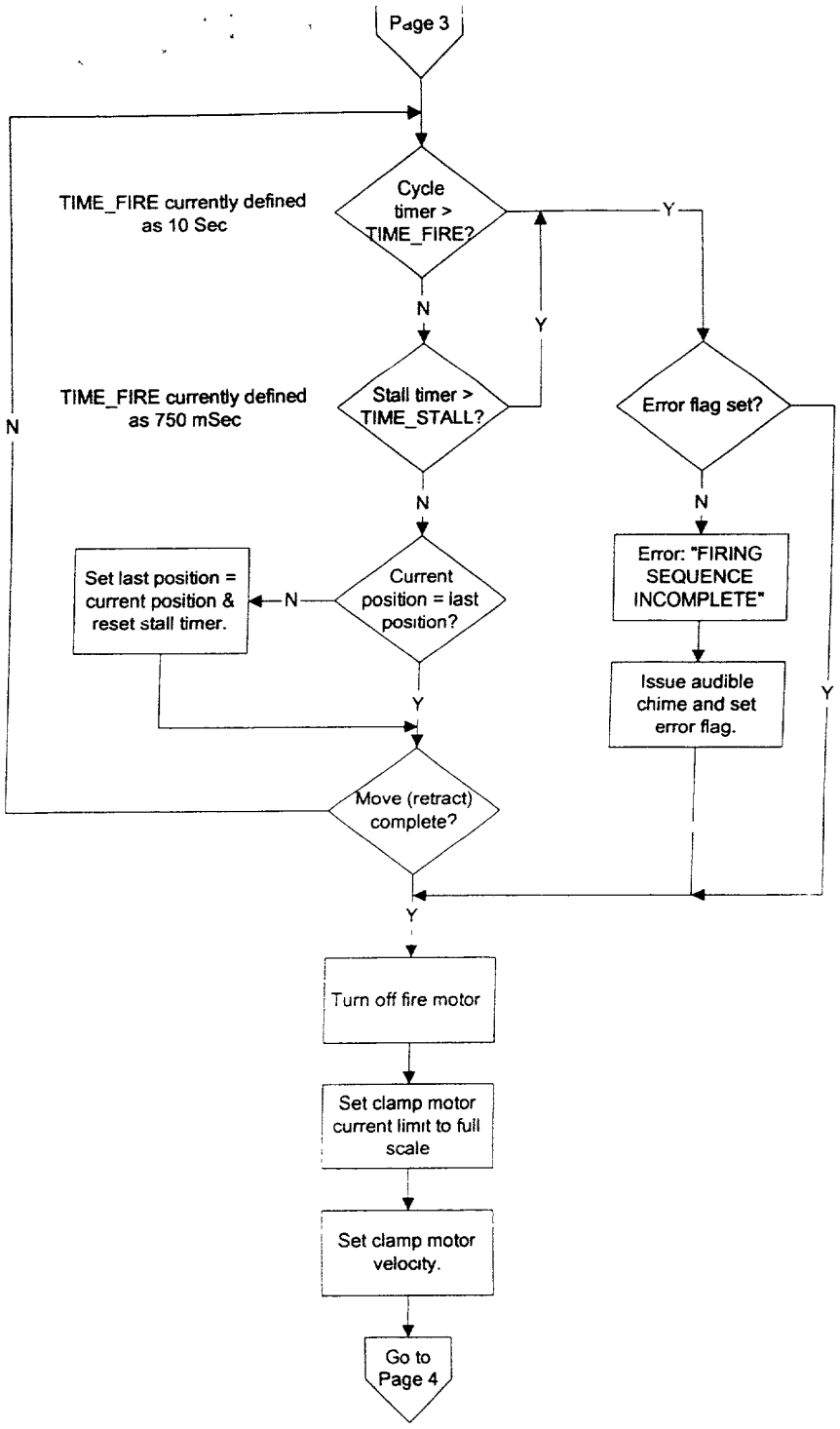

Page 3
TIME_FIRE currently defined as 10 Sec
Cycle timer > TIME_FIRE?
Y
N
TIME_FIRE currently defined as 750 mSec
Stall timer > TIME_STALL?
Y
N
Error flag set?
N
Y
Set last position = current position & reset stall timer.
N
Current position = last position?
Y
Error: "FIRING SEQUENCE INCOMPLETE"
Issue audible chime and set error flag.
Move (retract) complete?
Y
Turn off fire motor
Set clamp motor current limit to full scale
Set clamp motor velocity.
Go to Page 4

FIG. 21c

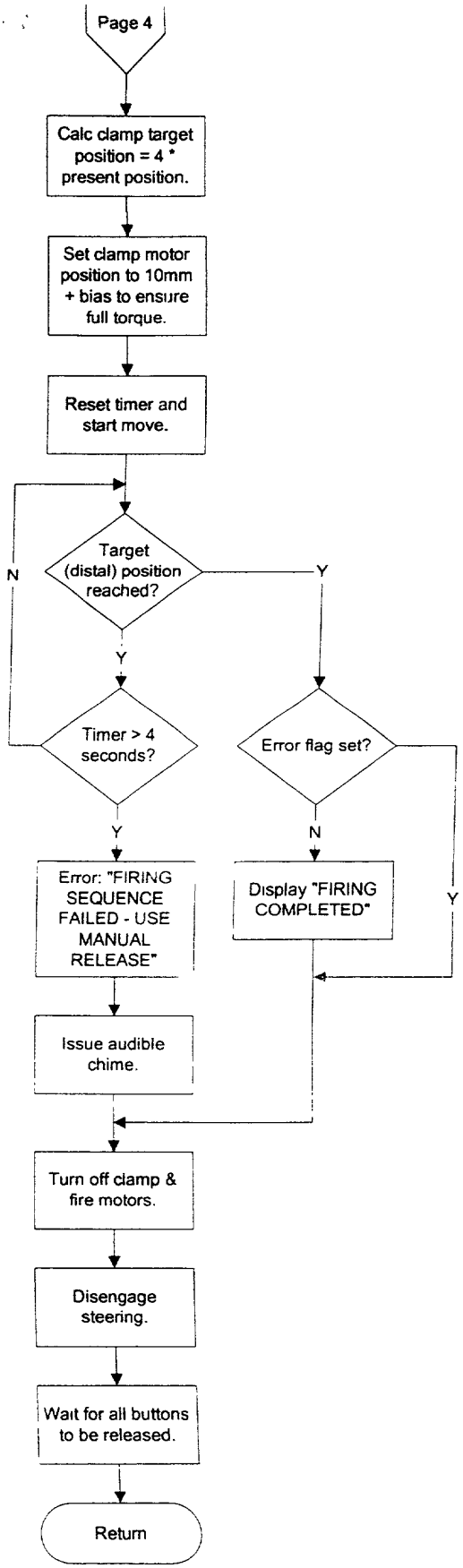

Page 4
Calc clamp target position = 4 * present position.
Set clamp motor position to 10mm + bias to ensure full torque.
Reset timer and start move.
Target (distal) position reached?
N
Y
Y
Timer > 4 seconds?
Error flag set?
Y
N
Y
Error: "FIRING SEQUENCE FAILED - USE MANUAL RELEASE"
Display "FIRING COMPLETED"
Issue audible chime.
Turn off clamp & fire motors.
Disengage steering.
Wait for all buttons to be released.
Return

FIG. 21d

US 6,957,869 B2

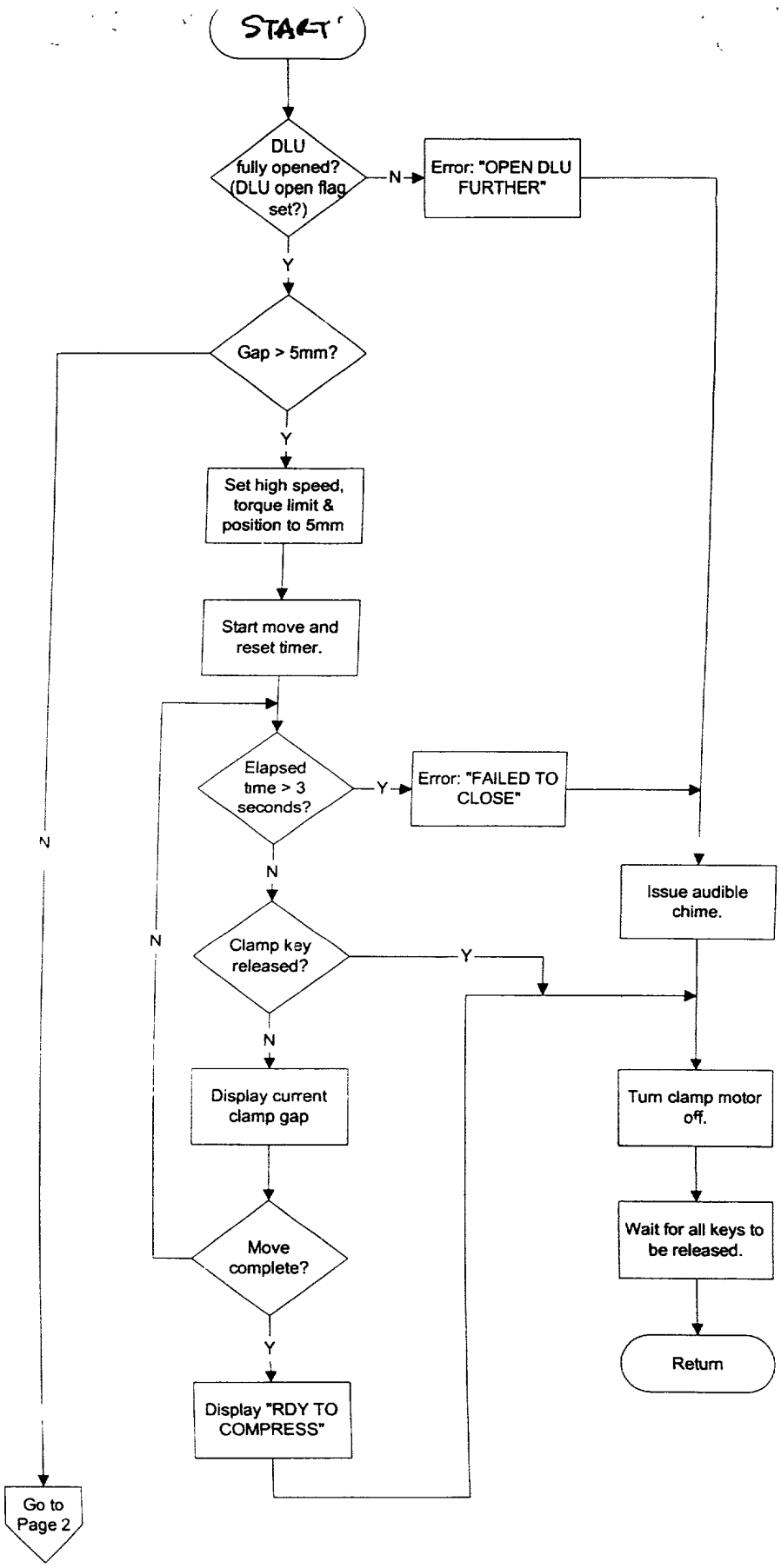


FIG. 22a

US 6,978,921 B2

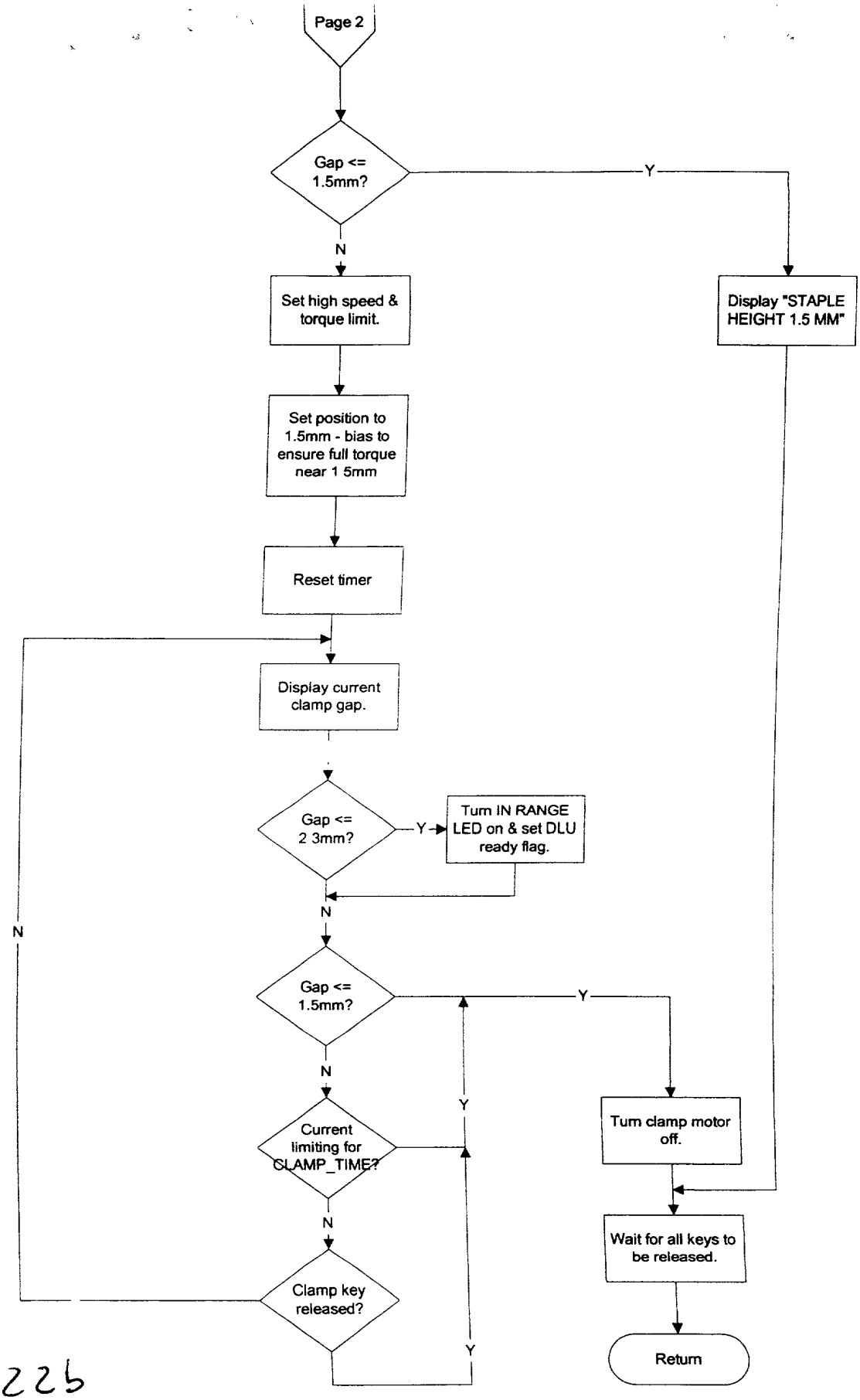
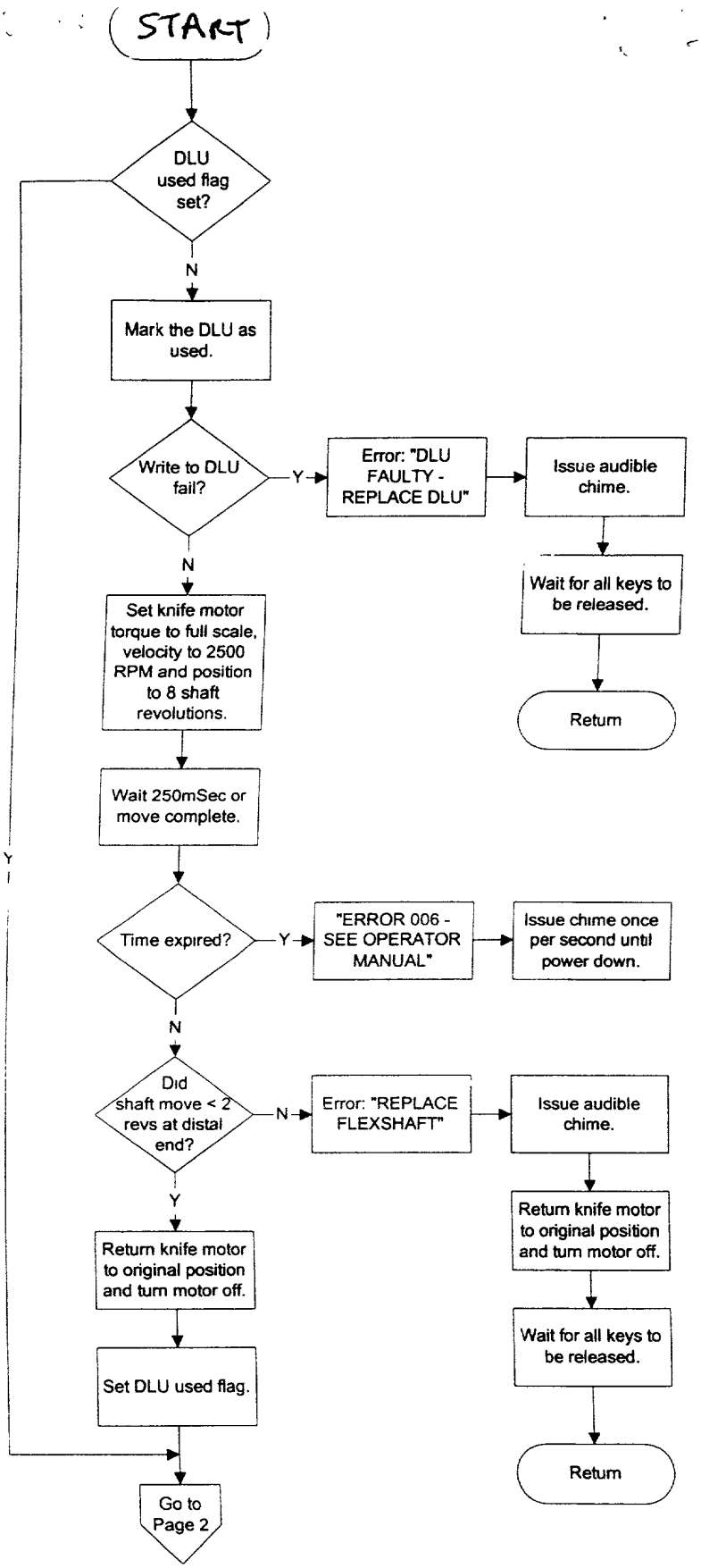


FIG. 22b



*The kernel tries 3x w/ 100mS time between tries to write DLU.

Fig. 23a

5,868,708 - 02/09/99

US 6,087,805

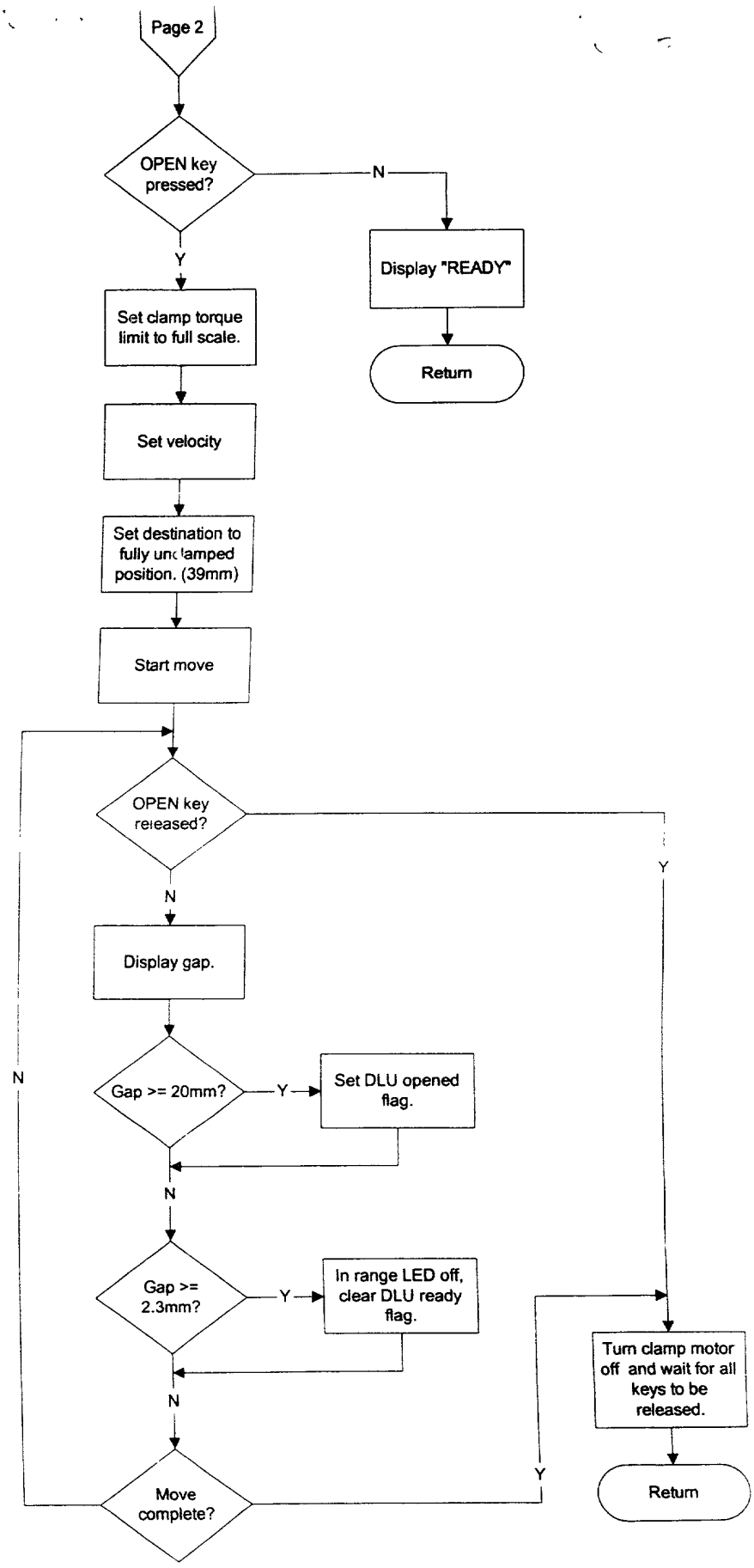


FIG. 23b